

THE IRON AGE

Established 1855

New York, March 19, 1914

Vol. 93 : No. 12

A 10,000-Ton Hydraulic Forging Press

Designed and Built for the Schoen Steel Wheel Works by the Bethlehem Steel Company, Involving Problems of Design, Manufacture and Transportation

BY C. VON PHILP*

A forging press, capable of developing 10,000 tons pressure from one main cylinder 72 in. in diameter, was installed some time ago in the Schoen Steel Wheel Works of the Carnegie Steel Company, McKees Rocks, Pa., by the Bethlehem Steel Company. It was built to form car wheels from heated round steel blanks at the rate of 40 per hour, but has operated at the rate of 60 per hour.

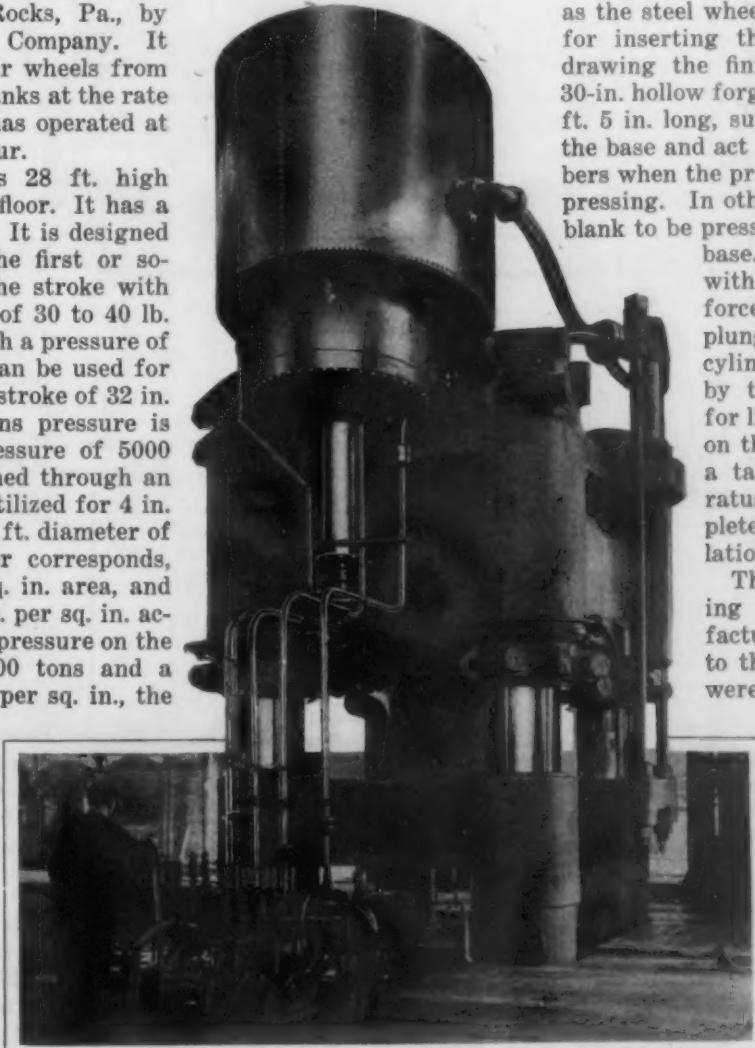
The press stands 28 ft. high above the operating floor. It has a total stroke of 32 in. It is designed to operate during the first or so-called idle part of the stroke with water at a pressure of 30 to 40 lb. per sq. in., after which a pressure of 2500 lb. per sq. in. can be used for any part of the total stroke of 32 in. When the 10,000 tons pressure is desired, a water pressure of 5000 lb. per sq. in., obtained through an intensifier, may be utilized for 4 in. of the stroke. The 6 ft. diameter of the working cylinder corresponds, of course, to 4075 sq. in. area, and a pressure of 2500 lb. per sq. in. accordingly develops a pressure on the plunger of over 5000 tons and a pressure of 5000 lb. per sq. in., the nominal pressure for which the machine is designed, develops the specified total pressure of 10,000 tons.

In brief, the press proper includes the following main parts: A cap, a nickel steel casting weighing 375,000 lb., in which is centered and bolted the main cylinder, likewise of cast nickel steel lined with copper $\frac{1}{2}$ in. thick. A plunger, also of nickel steel, to the bottom of which is attached the cross-head, this a steel casting weighing 250,000 lb., and in spite of

its size and form found to be unusually sound, (not a pin hole or defect being visible when machined.) A heavy cast steel base. Hydraulic apparatus for

stripping the formed product, such as the steel wheel, from the die, and for inserting the blank and withdrawing the finished wheel. Four 30-in. hollow forged steel columns, 33 ft. 5 in. long, support the cap above the base and act as the tension members when the press is in action compressing. In other words, the wheel blank to be pressed is carried by the base. The cross-head with the forming die is forced downward by the plunger working in the cylinder which is carried by the cap. Pull-backs for lifting the cross-head on the return stroke and a tank and other apparatus for the water complete the press installation.

There were interesting problems of manufacture owing in part to the large sizes; there were trying problems of design to meet the stresses and to give shapes that would on casting be free from internal stresses and blow holes; there were problems involved in such details as packing glands against high pressure, and there were problems in transportation which required the use of a car specially designed



General View Showing the Point of Control. The cross-head is in the bottom position and bolted to its top may be seen the plunger, which travels in a cylinder contained in the cap or head. At the top is the water supply tank and extending below its bottom is the low-pressure cylinder used to supply water to the main cylinder

some years ago by the Bethlehem Steel Company for transporting pieces of weight and large size, a car having trucks with 16 wheels at each end with a connecting bridge frame consisting of two parallel girders on which the load is placed. An article relat-

*Manager Machinery Department, Bethlehem Steel Company, South Bethlehem, Pa.

ing to the cap of the press was printed in *The Iron Age* of May 30, 1912, while some account of the transportation part of the problem in connection with the cross-head was given in *The Iron Age* of September 19, 1912.

Through the four corners of the base casting rise the 30-in. steel columns. The base rests on a large cast-steel nut on each column, and the cap is similarly fitted over the four columns with the same size and type of nut screwed on each column above the cap. It will thus be seen that when the press is in action the four nuts below the base and the four nuts above the caps transmit the tension to the columns. Each of these nuts has a threaded bearing for a distance of 33 in. Half nuts, on top of the base casting in the one case and underneath the cap casting in the other, serve to tighten these parts on the columns. The four columns are located on the corners of the square, 9 ft. 6 in. on a side, in other words, the columns are 9 ft. 6 in. on centers from their neighbors.

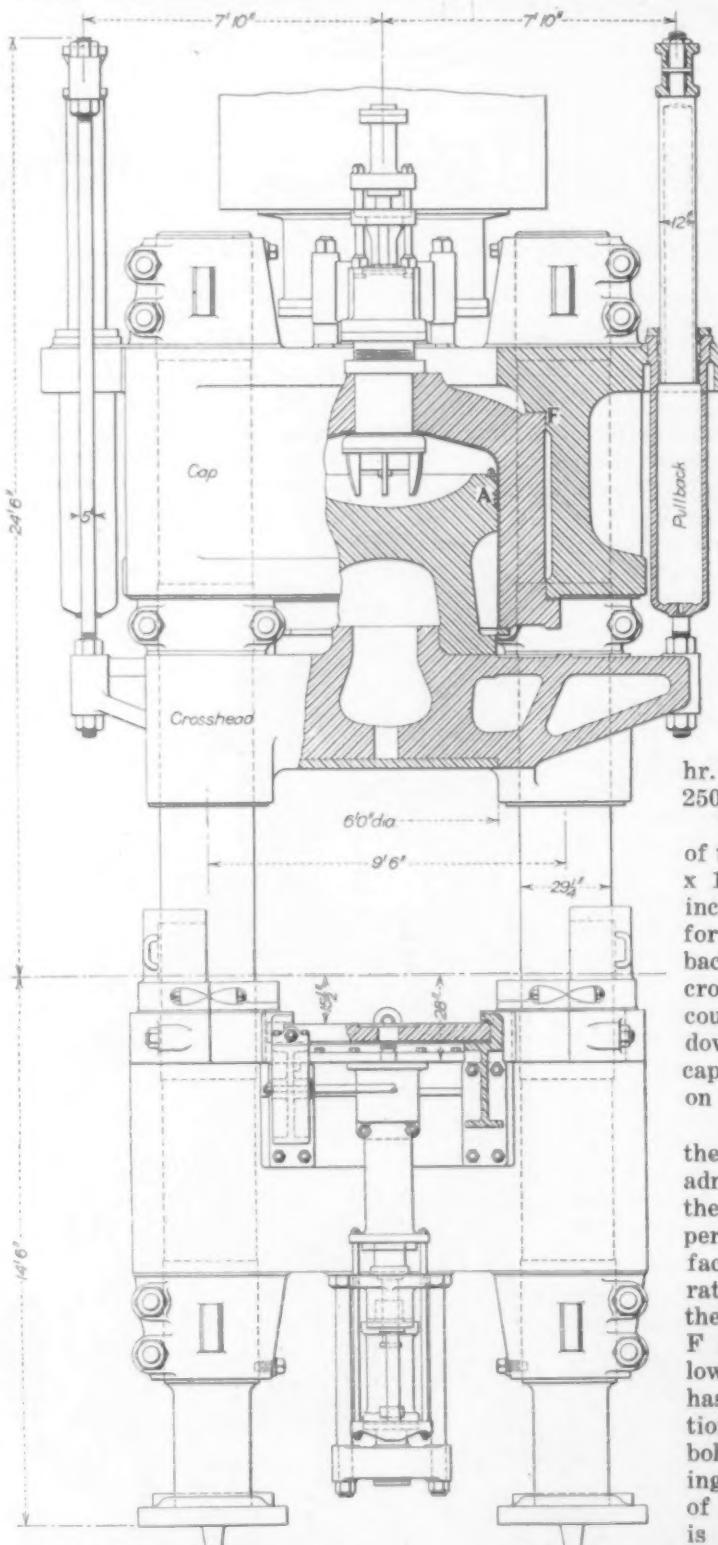
The columns are of acid fluid compressed steel. Each one was forged from an ingot cast in a mold 60 in. in diameter and 17 ft. high, in which it was subjected to the compression process commonly practiced at the Bethlehem steel plant to drive impurities and blow-holes to the central axis while the steel is solidifying. The resultant ingot was then bored through the center making a hole about 16 in. in diameter, this method to remove the segregations and blow holes collecting along the axis of the ingot as stated. The bored ingot was then heated and lengthened by the forging practice, bringing the inside diameter down to 9 in. At the completion of the forging the rough product was rough bored, then turned and in succession hardened, annealed and finally given a finished turning and threaded at the four points to receive the nuts and bored for

the required 10 in. clean boring under the specification. The manipulation of four such columns in the heat treating process, when it is recalled that each one is 30 in. in diameter and over 33 feet long, is naturally no simple procedure.

The steel of the columns showed on test a tensile strength of 86,000 lb. per sq. in.; an elastic limit of 43,000 lb.; a stretch of 20 to 22 per cent.; contraction, 40 per cent. The specifications regarding heat treatment stipulated that the columns were to be heated slowly to 820 to 840 deg. C., maintained at this temperature for not less than 8 hr., then allowed to cool slowly in the furnace to 250 deg. C. under the gas, to be removed from the furnace at this temperature and allowed to cool in the air. It was stipulated that at least 30 hr. should be consumed in heating the columns to the temperature specified and at least 20 hr. in cooling down to 250 deg.

The overall dimensions of the cap are 13 ft. 10 in. x 18 ft. 2 in., the latter including the extensions for supporting the pull-backs used to lift the cross-head, which of course, travels up and down between base and cap and is bronze bushed on the column guides.

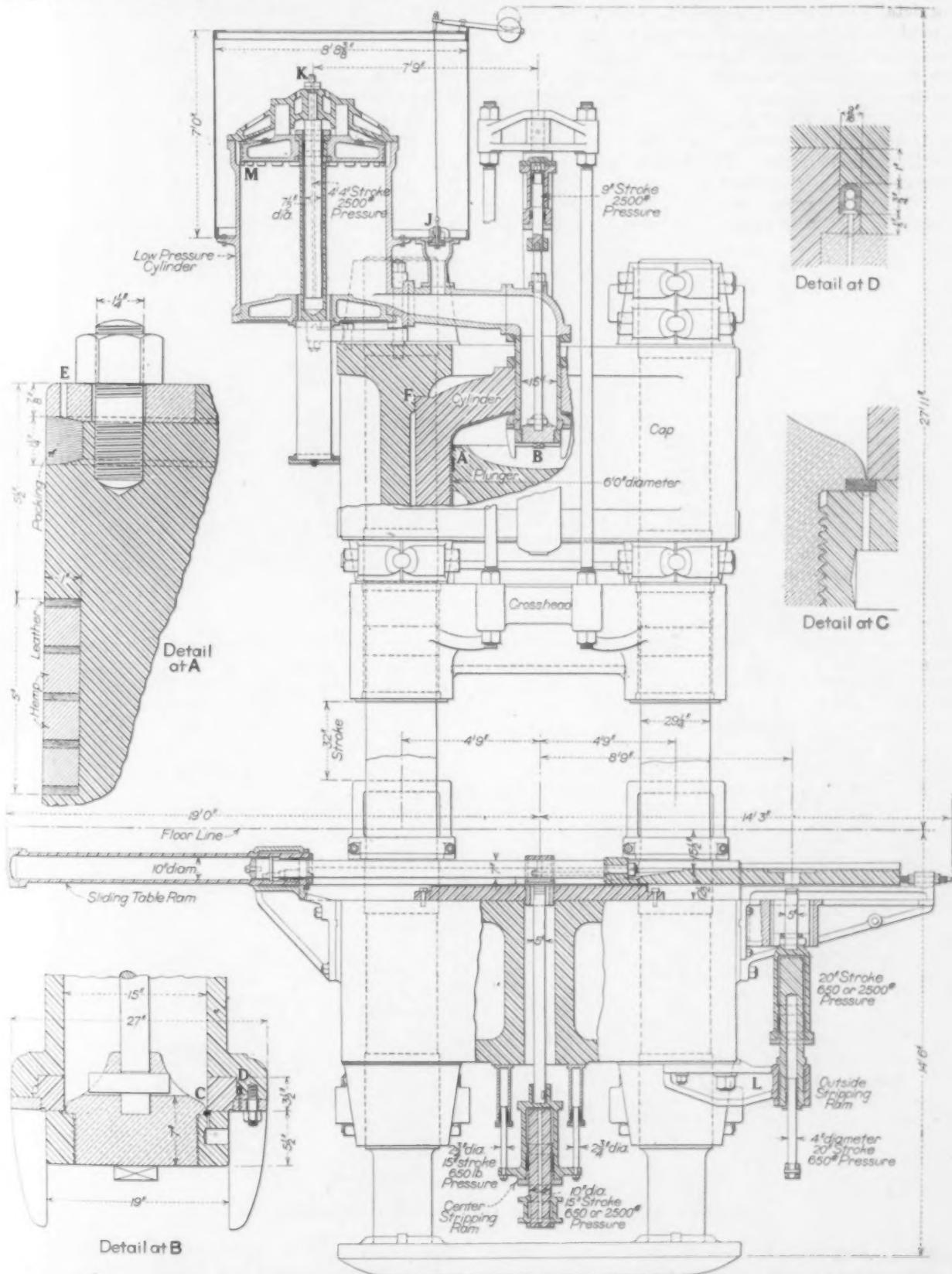
The cylinder, through the top of which water is admitted, is fixed within the cap as follows: Its upper part, which is machine faced, fits in to an accurately machined recess in the cap, as indicated at F in the drawings. The lower part of the cylinder has a flange-like projection for sixteen 2-in. steel bolts 14½ in. long screwing into the cap a distance of 2½ in. The cylinder is an acid nickel steel casting with walls 15 in. thick, and takes the shape, as indicated in the drawings, of a barrel the bottom end open and the top of a spherical form. It is lined with ½ in. thickness of copper, this comprising copper rolled in place to a thickness of 9/16 in. and bored on the wearing surface. The details of the method of supporting the bottom of the lining is indicated in special drawings of the cylinder, showing the use of a cast ring, provided with a recess, so that a



Sectional Elevation of the Press Showing in Addition to the Main Parts the Two Pullbacks for Lifting the Plunger to its Top Position

shoulder is provided all around the interior of the cylinder to fit against the bottom of the lining. This ring is held in place against the bottom of the cyl-

eter and 18 in. long, by means of which the cross head used to guide the plunger is attached. The packing is divided into two sections, one near the



Sectional Elevation at Right Angles to the Section on the Opposite Page, Showing the Method of Filling the Main Cylinder during the So-called Idle Part of the Stroke and also the Hydraulic Apparatus for Handling the Material to and From the Press, as well as Several Details

inder by means of 32 stud bolts $1\frac{1}{2}$ in. in diameter and about $5\frac{1}{2}$ in. long.

One of the especially interesting features of the plunger is the design of the packing, for which a detailed drawing is given above. The plunger itself, which of course is 72 in. in diameter to fit the 72 in. diameter cylinder, is 4 ft. 8 in. high. At the bottom flange, it carries 16 stud bolts 2 in. in diam-

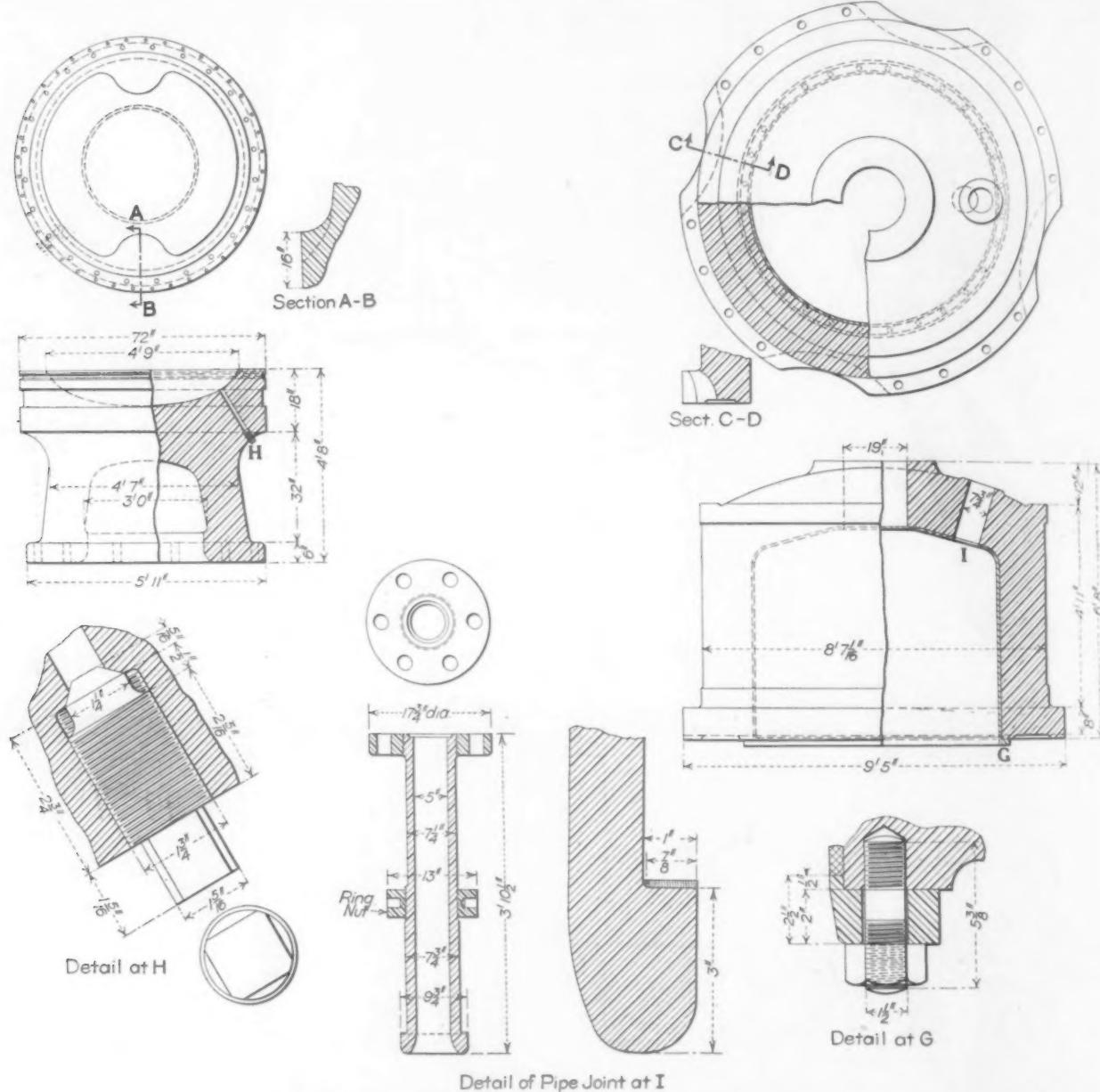
top, comprising a packing ring of leather, $1\frac{1}{4}$ in. on the rubbing surface and 1 in. deep, and the other at a distance $5\frac{1}{2}$ in. below the top, comprising along 5 in. of the rubbing surface alternate layers of hemp and leather. There are four rings of hemp, 1 in. square in cross section, with $\frac{3}{16} \times 1$ in. leather packing between the hemp and at top and bottom of the packing, as indicated in the sketch. The leather

packing at the top is held by a follower of bearing metal in the shape of a ring, which is held in place by 24 stud bolts, $1\frac{1}{4}$ in. in diameter and an interesting detail is that by means of $3/16$ -in. holes, as at E, spaced so that there are 40 of them around the periphery of the plunger, the water pressure may reach the leather packing directly. A detail which may be mentioned is the design of a phosphor bronze plug to the plunger, which plug may be removed whenever it is desired to drain the basin which the top surface of the plunger forms. The plug is located at H, in the drawing of the plunger.

The water, which, of course, is so far as possible used over and over again, is delivered into the press

working cylinder of the press, which with its 72 in. diameter has contents of about 130,000 cu. in. for its maximum stroke of 32 in. or 115,000 cu. in. for the 28 in. stroke, which may be the limit when 4 in. of the stroke takes water from an intensifier at the 5000 lb. unit pressure.

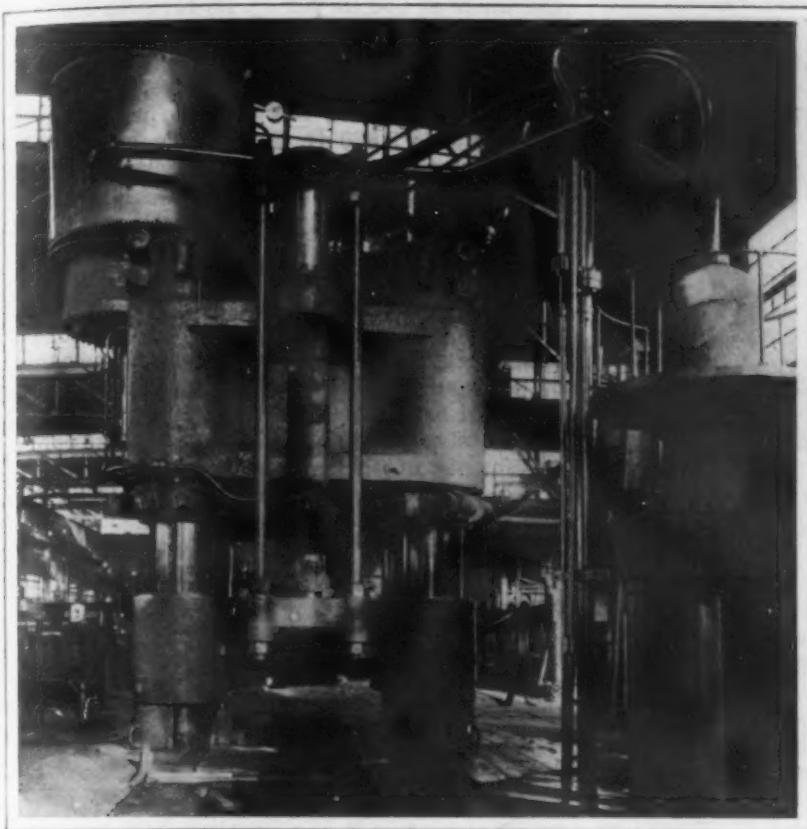
The piston rod of the low-pressure cylinder is hollow and contains a sliding fit stationary plunger, practically as long as the piston rod and $7\frac{1}{2}$ in. in diameter. This plunger has a hole running through its entire length, $1\frac{1}{16}$ in. in diameter, and the upper part of this plunger at a point immediately above the cylinder, that is, at K, is connected to 2-in. double extra strong piping, through which water at



Details of the Main Cylinder, at the Right, and the Plunger, at the Left

from an overhead tank, carried by the press. There is also a low-pressure cylinder mounted on the press within this tank, and a conduit or passage joins the low-pressure cylinder with the high-pressure or main cylinder of the press. Water from the tank is admitted into this passage under the control of a counterweighted valve, as indicated at J. The low-pressure cylinder has a diameter of 5 ft. and a maximum working stroke of about 52 in., so that allowing for the 10 in. guiding piston rod attached to the piston of the cylinder, the contents of the cylinder swept out in a stroke amount to 145,000 cu. in. This indicates that the supply is abundant for the main

2500 lb. per sq. in. is delivered. The plunger is stationary as stated and the hollow piston rod surrounding it is forced downward with the admission of the high-pressure water, carrying downward also the piston and displacing the water from the low-pressure cylinder into the high-pressure or main cylinder. The diameter of the plunger being $7\frac{1}{2}$ in. and the diameter of the low-pressure cylinder being 5 ft., it is noted that with a 2500-lb. water supply, the water in the low-pressure cylinder is 39 lb. per sq. in., and therefore sufficient to keep the pressure in the main cylinder, as it descends through the so-called idle stroke, at the required 30 to 40 lb.



View of the Press to Show One of the Two Main Pull-backs

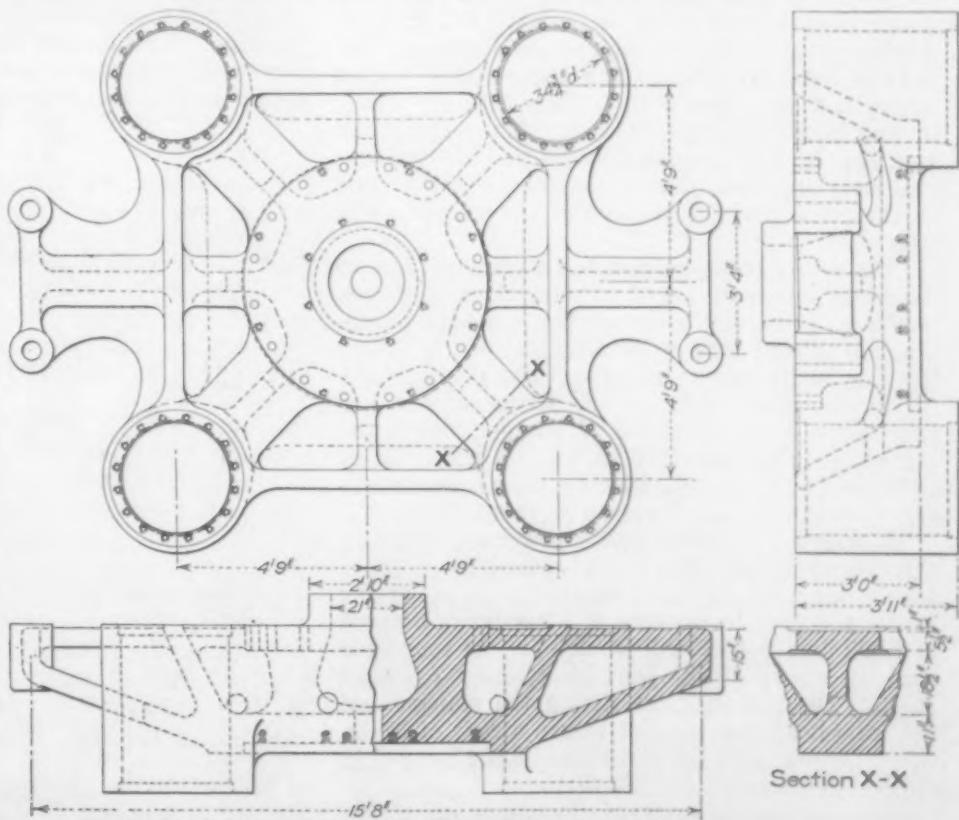
The inflow and outflow of this water with the main cylinder is controlled by a 15 in. check valve, so called, B, operated by means of a pilot valve, mounted above it. For example, on the completion of the working stroke of the press and the return of the plunger in the main cylinder, this valve is, of course, open, and the water is returned into the low-pressure cylinder. If, as is likely to be the case, an excess of water has been admitted from the independent or 5000 lb. supply to the main cylinder, the excess water escapes from the low-pressure cylinder when the piston reaches its uppermost position. There are ports indicated in the main drawing at M, M, uncovered when the low-pressure piston reaches the top position, and the water escaping is returned to the tank surrounding the low-pressure cylinder. Thus the water for the hydraulic cylinders is not wasted but is used over and over again.

The low-pressure water inflow to the main cylinder is at the top, as indicated, while the high-pressure and 5000 lb. water enters at a point off to one side in the head of the cylinder. Naturally, owing to the high pressure sustained,

the packing of these connections is a feature, and detailed drawings are included among the illustrations. So far as the 15-in. check valve is concerned, it is noted that the valve itself comprises a cone of manganese bronze, into the top of which the valve rod is inserted with a push fit and fastened by a taper pin or cotter of forged steel, $\frac{3}{4} \times 2\frac{1}{4}$ in. in size. The valve seat comprises a ring of nickel steel, which is held against the end of the 15-in. sleeve or conduit by means of a ring made all in one piece with the valve guides and held in position by 1-in. tap bolts. The joints between the valve seat ring and the end of the conduit are equipped with U-packings of $\frac{3}{16}$ in. thick leather. As indicated in the detail of this packing (see detail of C, the main general drawing), it is to be noted that the inside of the U-packing is in communication by means of a $\frac{1}{8}$ in. diameter channel with the interior of the main cylinder. The manganese bronze does not seat

with the ring, but screwed to the bottom of the manganese bronze is a nickel steel ring designed to transmit pressure directly from steel to steel with a packing ring of leather $\frac{5}{16}$ in. thick, the ring having an outside diameter of $15\frac{1}{2}$ in. (see detail of D, the main general drawing). In this case also is to be noted the arrangement for putting the pressure side of the packing into direct communication with the interior of the main cylinder.

The admission of the high-pressure water to the



The Construction of the Cross-head in Some Detail



View Underneath the Base of the Press Showing the Bottom of Two of the Main Columns, the Center Stripping Ram and, at the Right, One of the Nuts Screwed to the Column Underneath the Base

main cylinder direct is made through a special forged steel connection 5 in. in diameter, with walls $1\frac{1}{8}$ in. in thickness. This connection has a flanged end with the discharge opening rounded off on a 5 in. radius, and the joint between this connection and the top of the cylinder or cylinder wall is made by means of a soft copper washer $\frac{1}{8}$ in. thick and about $\frac{3}{8}$ in. wide. (See detail I, page 716.)

The hydraulic apparatus applied in connection with the base of the machine includes a ram for a sliding table on which the blanks to be formed are pulled to the center position of the press and then returned to the loading position when the formed product is removed and the new blank received. It includes also two stripping rams, one located under the center of the press for lifting the completed wheel out of the bottom die, and an outside stripping ram which lifts the wheel from the sliding table, so that it may be carried away from the press.

The ram for the sliding table takes water at 650 lb. pressure, while the stripping rams may take water at either 650 lb. or, when necessary to exert greater force to remove the pressed article, a pressure of 2500 lb. The sliding table ram is double acting and has a long steel cylinder with 1 in. walls and an inside diameter of 10 in. The stroke of the ram is 8 ft. 9 in., or the distance between the central stripping ram, that is the vertical center line of the press, and the position of the outside stripping ram.

The center stripping ram has a plunger 10 in. in diameter and is arranged to work on a maximum stroke of 15 in. and there are two pull-back plungers, one on each side of the working ram, to return the ram to its bottom position, these plungers $2\frac{3}{4}$ in. in diameter. The outside stripping ram has similarly a 10-in. diameter of plunger, but is designed for a stroke of 20 in. and its pull-back, as indicated in the general drawing, is a plunger working within the main plunger, 4 in. in diameter.

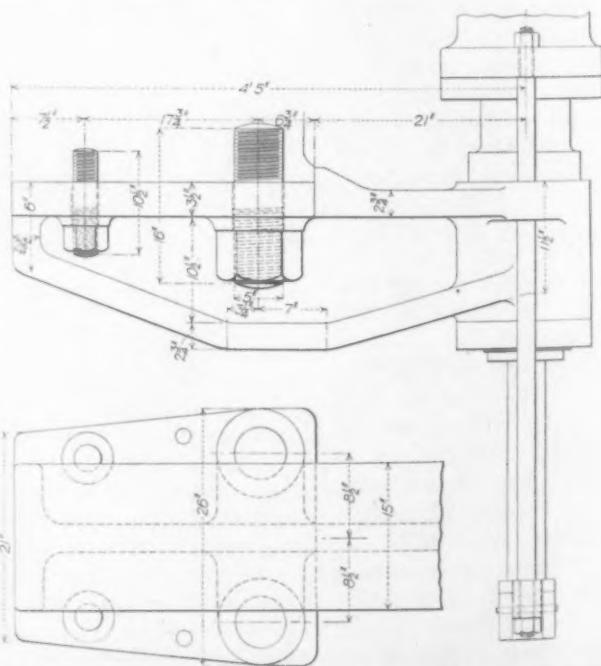
A summary of the hydraulic power requirements may be made as follows: The working cylinder taking water at 40 lb. pressure for 28 in. of the stroke and then in the case of a maximum demand at 5,000 lb. for 4 in. will involve for the completed working stroke of the working cylinder 7,160,000 ft. lb. The pull-back for lifting the plunger and the cross-head, for the full return stroke of 32 in. would involve, with the pressure of 2,500 lb. used in the two pull-backs, 1,500,000 ft. lb.

For a complete cycle of the operation of the press it may be assumed that the sliding ram will

use water at 650 lb. per sq. in. for both the ingoing and outgoing strokes, or 892,000 ft. lb. The central ram, should it be required to supply water at 2,500 ft. pressure, would for its complete stroke of 15 in. take 245,500 ft. lb., but its two pull-backs would increase this 9,650 ft. lb., making a total for the central ram in the up and down stroke of 255,150 ft. lb. Similarly for the outside ram the total requirements, including the pull-back, would be 341,150 ft. lb., or a grand total for a complete cycle of the press, operating both the central and the outside ram, as well as the sliding ram, 10,148,000 ft. lb. While the press was built to press 40 round steel blanks per hour, the actual output has amounted to 60 per hour, so that when the maximum pressures indicated are used and the output is at the rate of 60 wheels per hour, the total maximum power requirements of the hydraulic system in the press proper is, under these circumstances, 307.5, or say, 300 hp.

An interesting point in connection with the balanced cylinders for returning the plunger, with its cross-head and die, to the top position, is that these two cylinders are of sufficient length to allow the plunger to be withdrawn from the cylinder, so that a man may get into the cylinder for the examination of the valve. It is intended that the cylinders of the pull-backs shall be strong enough to raise and lower the cross-head at a speed of 10 in. per second when running on the low-pressure water. A device is furnished in connection with the pull-back cylinders, involving an air cylinder 16 in. in diameter with a 16-in. stroke and a plunger of the proper size, in connection with the regular operating pressure of the plant, to secure the cushioning desired in the piping between the operating valve and the pull-back cylinders.

As regards the construction details in connection with this apparatus special mention may be made of the outside stripping ram. With the 10 in. diameter of the plunger and the pressure of 2,500 lb. per sq. in., the force which it is capable of developing is 100 tons. It will be noticed that the plunger, which is stationary, is carried at the end of a bracket fastened to the base casting of the machine. This bracket has an I-beam section with a web $2\frac{3}{4}$ in. thick, and gradually increasing in height toward the point of support at the machine



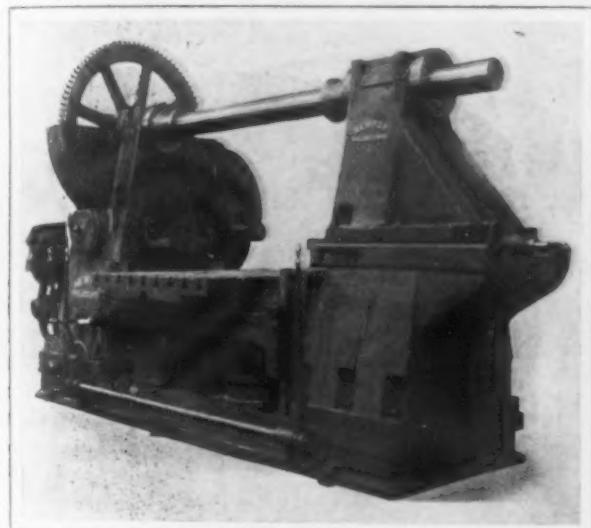
Detail of the Bracket Support for the Outside Stripping Ram Shown at L in the Elevation on Page 715

frame and with flanges also $2\frac{3}{4}$ in. thick and 15 in. wide, as indicated in the accompanying special drawing of this bracket. It is widened on its bearing face where connected to the machine and is supported to the underside of the machine, the pressure carried by the brackets being transmitted to four bolts—two stud bolts 5 in. in diameter and 16 in. long and two stud bolts $2\frac{1}{2}$ in. in diameter and $10\frac{1}{2}$ in. long.

In conclusion a word may be said with regard to the piping. Wherever 5,000 lb. pressure is used the piping is made of steel forgings and bored. Double extra piping is used for 2,500 lb. pressure and single extra strong piping for 650 lb. pressure is used. Ordinary gas piping suffices for the drain pipes.

Machine for Boring Locomotive Cylinders

For boring modern locomotive cylinders having circular valve chambers bored from the solid cylinder casting in the shortest possible time, the Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has brought out a large machine. It was decided that by having only one setting of the work for all operations, a con-



A Large Machine Designed for Boring Locomotive Cylinders Having Circular Valve Chambers Bored from the Solid Cylinder Coating

siderable amount of time would be saved, and the machine is fitted with compound tables having traverse, longitudinal and vertical adjustments. This arrangement is used to permit the circular valve chamber to be bored first and the cylinders next, thus enabling the valve chamber bushing to be fitted while the cylinder is being bored, and finally bored itself without disturbing the location of the work on the table.

The machine is driven by a 20-hp. General Electric motor, running at 400 to 1200 r.p.m., thus giving spindle speeds of from $2\frac{1}{2}$ to $7\frac{1}{2}$ r.p.m. The main drive for the spindle is through a steep lead wormwheel having a bronze ring mounted on the spindle sleeve, engaging with a hardened steel worm, fitted with roller thrust bearings, both being entirely incased to give continuous lubrication. The drive is arranged so that the fast power traverse feature of the spindle may be used while the spindle is not rotating, and this, together with the rotation of the spindle and the power elevating mechanism of the table, can be engaged or disengaged by levers located on the operating side of the machine at the main head and also at the outboard bearing without stopping the motor. The

feed is taken from a gear box having eight gears distributed on a sliding sleeve to give six changes without removing the gears, the adjustment of the sleeves being accomplished by latch levers. The trolley is mounted on the horn for feeding and the saddle has roller bearings to take the thrust in both directions. A rotating screw provides the feed and the fast power traverse.

The outboard bearing has an independent in-and-out adjustment, so that the cylinders may be mounted on the table and adjusted to come within range of the facing head on the main spindle sleeve, and the outboard bearing is then adjusted to bring its facing head within range of the adjacent spindle flange. It will be noticed that the facing heads have an eccentric clamp, permitting the sleeves of the spindle to rotate while the facing heads are idle, if this should be desired.

The spindle, which is 7 in. in diameter, has a double spline and a continuous travel of 140 in. Rapid power traverse in both directions is provided, giving sufficient capacity to bore and finish both ends of cylinders 50 in. long. The work tables have four elevating screws and the cross adjusting table is 54 in. wide and 72 in. long. The range of vertical adjustment provides for distances of from 39 to 51 in. from the top of the table to the spindle center. The maximum distance between the facing arms is 60 in., and the net weight of the machine is 75,000 lb.

Large Morgan Crane Contract

The Morgan Engineering Company, Alliance, Ohio, has been awarded the contract for 22 cranes and special machines by Corrigan, McKinney & Co., Cleveland, Ohio, for the new plant now being built by their River Furnace Company. This contract is said to be the second largest crane contract placed at any one time in the United States, the largest having been for the cranes for the Minnesota Steel Company, placed with the Morgan Engineering Company in July, 1912. The Corrigan-McKinney list is as follows:

Two 150-ton, 7-motor double drive, double trolley ladle cranes; large trolleys, 150 tons; small trolleys, 25 tons; span, 59 ft.

Two 75-ton, 7-motor double drive, double trolley ladle cranes; large trolleys, 75 tons; small trolleys, 25 tons; span, 79 ft. 6 in.

Two 5-ton, 5-motor double drive, low type open-hearth floor-charging machines; span, 24 ft. 6 in.

One 75-ton, 7-motor, double drive, double trolley ladle crane; large trolley, 75 tons; small trolley, 25 tons; span, 72 ft. 6 in.

One 150-ton, 5-motor double drive ingot stripper; span, 73 ft. 6 in.

Two 10-ton, 7-motor double drive ingot drawing and charging machines known as soaking pit cranes, each having a 5-ton auxiliary hoist; span, 73 ft. 6 in.

One 50-ton, 5-motor double drive blooming mill crane, with 10-ton auxiliary hoist; span 80 ft.

One 60-ton, 4-motor engine room crane, with 10-ton auxiliary hoist; span, 53 ft.

One 10-ton, 3-motor magnet handling crane; span, 70 ft.

Two 10-ton, 3-motor magnet handling cranes; span, 75 ft.

One 15-ton, 3-motor magnet handling crane; span, 75 ft.

One 15-ton, 3-motor magnet handling crane; span, 45 ft. 9 in.

One 15-ton, 3-motor crane; span 50 ft.

One 15-ton, double hoist, double drive crane, each hoist 7½ tons; span, 120 ft.

One 25-ton, 4-motor machine shop crane, 5-ton auxiliary hoist; span, 50 ft.

One 5-ton, 3-motor crane for calcining plant; span, 41 ft.

One 5-ton, 2-motor crane for machine shop; span, 20 ft. 10 in.

A. M. Castle & Co., Chicago, the well-known jobbers of iron and steel, whose large warehouse on the North Branch of the Chicago River was completed about a year ago, will enlarge it with an addition for which an expenditure of \$30,000 is contemplated.

NEW MULTIPLE DRILLING MACHINE

Outside Control of Vertical Adjustment of Spindles—Helical Gear Drive

A new type of multiple-spindle high-speed drilling machine has just been brought out by the Baush Machine Tool Company, Springfield, Mass. Each spindle has an independent vertical adjustment, controlled by an outside clamping screw. The drive is through helical gears, which are inclosed in the case A and immersed in oil. The main vertical drive shaft is arranged to slide either up through the yoke or down through the head, as the case may be, in this way economizing headroom and making it possible to disassemble the shaft downward in case there is not sufficient room overhead for its removal. The shaft runs at approximately drill speed and therefore is not subject to the stresses which were formerly placed upon it owing to the fact that it ran at approximately one-quarter of the drill speed.

The yoke provides four changes of speed by means of gearing, the intention being to drive with a single belt from a motor or lineshaft. In the machine shown, however, the specifications called for 12 changes of speed, hence three are obtained by a three-step cone pulley, in conjunction with the four procured through change gearing in the head.

The feeds are four in number, two obtained by gearing with a jaw clutch and two through a two-step cone pulley, the purpose being that the belt shall run on the step most suitable for the customer's requirements, on the slow speed for steel and probably on the high speed for cast iron. Consequently the belt would not be changed often, under usual working conditions, but its range of usefulness is large, because of the option provided. The feeds are controlled by the lever B and the spindle speeds by the levers C and D, which are arranged so that one cannot be shifted until the other has been brought to the neutral position.

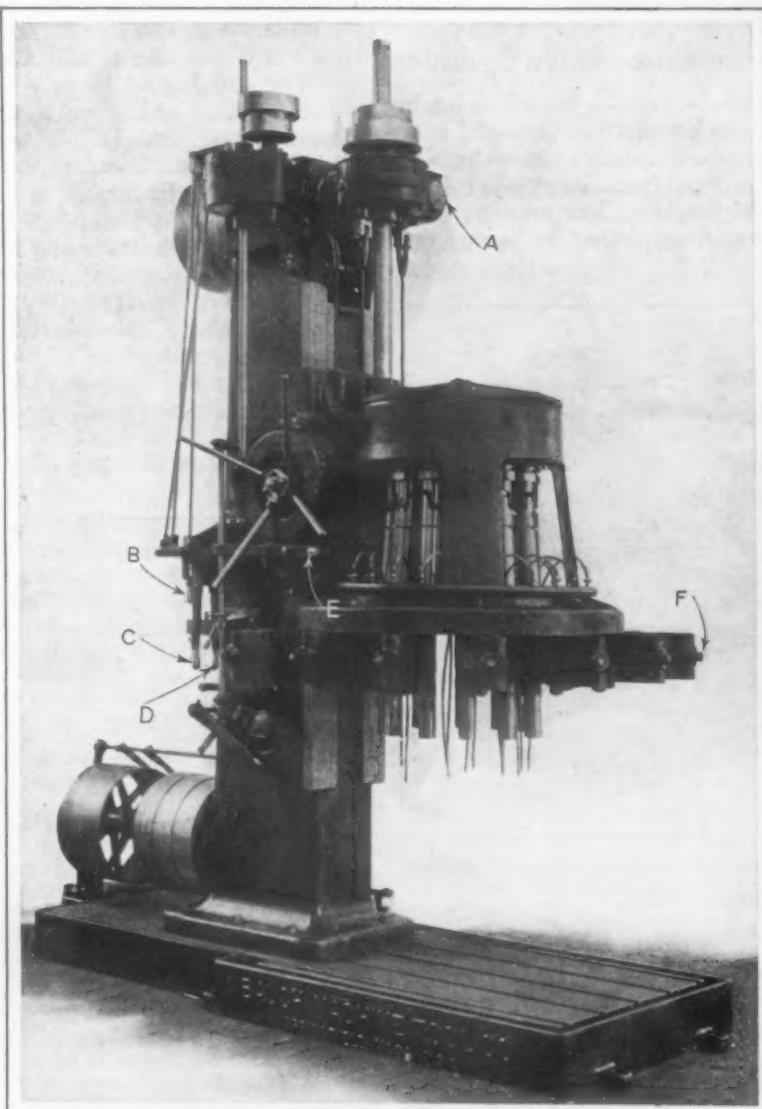
The feed of the head is thrown in by a single pull forward of the lever E, and the reverse motion

throws out the feed. Also, the reverse end of the lever is provided with an automatic feed stop to trip when the required depth of hole is reached.

The head is operated by a hand lever and rack and pinion and is counterweighted, the load being distributed among four cables which run on roller bearing sheaves. As the counterweight is one-half the weight of the head it travels twice as far. In addition, an automatic safety device locks the head against falling in the event of an accident to the cables.

The spindles are of rugged construction, including the adjusting arms, and each is provided with a special ball thrust bearing to take the thrust of the drills. The bearings are made with extra large balls and grooved races. Each spindle is also arranged with a disconnecting nut at the top, so that it can be taken out when the work does not require the full complement of spindles.

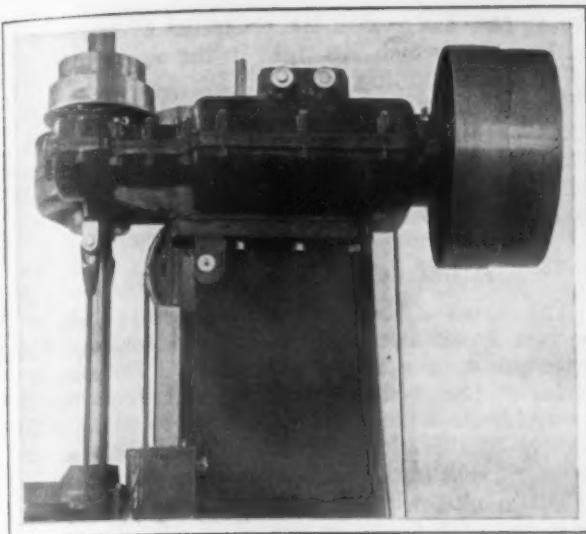
The independent vertical adjustment of each of the spindles is controlled by an outside clamping screw and nut as indicated at F. This makes an extremely convenient arrangement and at the same time provides but a single point to be fastened or unfastened. When all of the drill spindles are loosened up the head is brought down by the hand lever until the drills all enter the jig proper and then until each drill lifts its own spindle to the height indicated either by the irregular surface of the



The New Baush Multiple-Spindle Drilling Machine

work or the different length of drills. By the tightening of a single nut, each spindle is properly secured in position. As the driving shafts are carried on roller bearings and as there is rigidity at the limit of feed of the high-speed drills it is found possible to drive the machine at proper speeds.

The Kardo Company, Cleveland, Ohio, has been formed to take over eight patents on front and rear automobile axles that have been held by the Peerless Motor Car Company and the American Ball Bearing Company, Cleveland, and the Packard Motor Car Company, Detroit. Alvan Macaulley, of the Packard Company, is president of the new company; T. W. Frech, of the Peerless Company, is vice-president, and Fred C. Dorn, of the Ball Bearing Company, is secretary and treasurer.



The Yoke of the Baush Machine Which Carries the Helical Gear Drive

Study of Workmen's Compensation

August Belmont, chairman of the workmen's compensation department of the National Civic Federation, announces the publication of the report on the operation of State workmen's compensation laws made by the commission created in July, 1913, by the National Civic Federation and composed of employers, legal experts and labor representatives. Its value is attested by the fact that the United States Senate ordered it printed as a Government document.

The workings of the various compensation laws in States having had any important experience are reviewed and analyzed in a way to bring out distinctly the strong and weak provisions. The findings are based on personal conferences and hearings in different sections of the country all the way from the Atlantic to the Pacific, and on replies to thousands of letters of inquiry. The labor viewpoint as to the benefits derived from workmen's compensation laws was sought and opinions were secured from employers, public officials and insurance men.

The commission found a growing satisfaction with compensation laws among both employers and workmen. All suggestions for changes related to the compensation law, no one seriously thinking of repealing it or going back to the old liability system. Persons attended the conference who had originally opposed the compensation plan, but who, after experience under it, expressed their warm approval of its principles. Among these, besides both large and small employers, were workmen.

This volume, which is practically a working handbook of 200,000 words, may be had, free of charge, on application to the workmen's compensation department of the National Civic Federation, thirty-third floor, Metropolitan Tower, New York City.

A unique deal was completed when the Sarnia Fence Company, Sarnia, Ontario, Canada, agreed to turn over its Western business to the Grain Growers' Grain Company, which will pay an agreed price per ton for the output of the factory, and will retail it among the members of the Grain Growers' Association of Manitoba and the United Farmers of Alberta, at a working margin above cost.

Sloss-Sheffield Steel & Iron Company

The report of the Sloss-Sheffield Steel & Iron Company for the year ended November 30, 1913, gives the gross sales and earnings at \$5,326,554, against \$5,229,719 the previous year, and net earnings \$1,020,831, against \$877,664. The income account compares as follows:

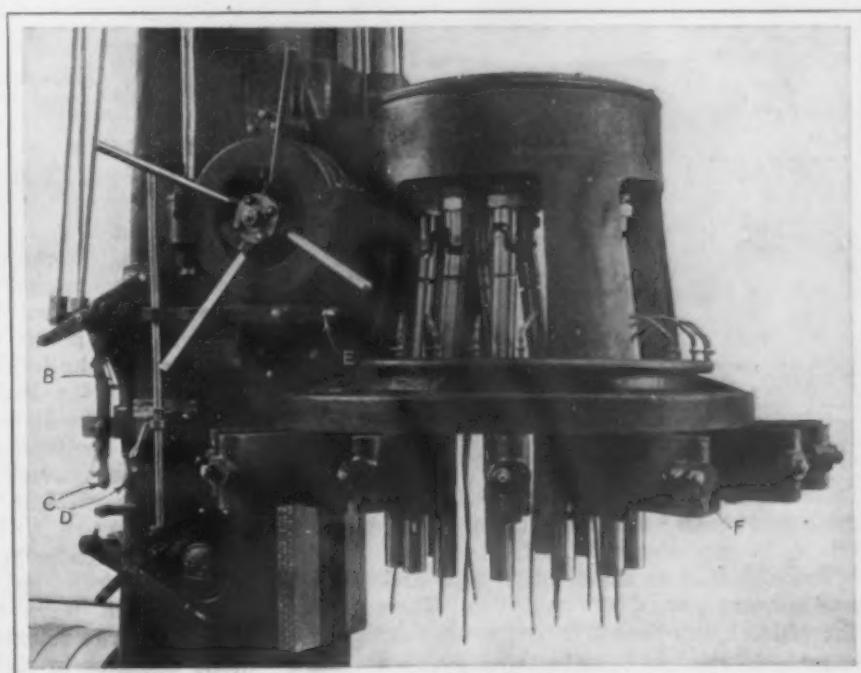
	1913.	1912.
Profit on pig iron after charges for depreciation on coal and iron ore, 25c. per ton on iron for extraordinary repair and renewals and 35c. per ton profit on coke manufactured	\$ 509,093	\$ 493,961
Profit on coal	102,685	74,756
Profit on coke	125,612	108,506
Ore sales	2,269	1,854
Rent, royalties, etc.	240,119	217,776
Interest, dividends, etc.	14,298	14,476
Total income	994,076	871,328
Taxes and license	65,285	64,117
General expense	33,076	27,408
Interest	217,249	226,548
Surplus	678,466	553,255
Preferred dividend	469,000	469,000
Surplus	209,466	84,255
Previous surplus	3,126,948	3,042,693
Total surplus	\$3,336,414	\$3,126,948

The balance sheet, as of December 31, is as follows:

	Assets.	1913.	1912.
Property account	\$22,473,647	\$22,136,196	
Treasury securities	244,320	244,320	
Stocks and bonds in other companies	400,306	400,306	
Cash, bills and accounts receivable	1,035,880	889,342	
Supply of raw and finished material	711,703	366,337	
Stock in company's stores	74,521	74,926	
Extension, renewal and replacement fund	116,108	180,379	
Unexpired insurance and taxes	6,029	5,785	
Total	\$25,112,515	\$24,297,594	
	Liabilities.		
Preferred stock	\$ 6,700,000	\$ 6,700,000	
Common stock	10,000,000	10,000,000	
Bonds	4,000,000	4,000,000	
Current accounts	502,690	401,715	
Payrolls	73,411	68,931	
Bills payable	500,000	500,000	
Profit and loss surplus	3,336,414	3,126,948	
Total	\$25,112,515	\$24,297,594	

In his accompanying remarks, President J. C. Maben says:

"The output of the company's furnaces shows a small increase over that of 1912. At the beginning of the year we had 22,500 tons of iron stored on the furnace yards, belonging to the company. At



Details of the Head of the Baush Machine Showing the Outside Clamping Screws for the Vertical Spindle Adjustment

the close of the year this had been increased to 55,000 tons, and since then to 75,000 tons, owing to the slack demand. The falling off in demand may be traced to the agitation of the tariff question and the adoption of the bill; and the unsettled conditions of business generally throughout the country, the causes of which need not be discussed here.

"The average delivered price of iron in 1913 showed an improvement over that of 1912, and although we shipped some 70,000 tons less iron than in the previous year, which affected our earnings adversely, the profits in 1913 were larger. The profit from coal and coke also showed increases, resulting in a net increase in profits of \$125,000, not estimating any profit from the iron on our yards.

"The company began the fiscal year with no floating debt whatever, but owing to the large expenditures for improvements and the accumulation of iron on the furnace yards, we were forced to borrow, and we closed the fiscal year with a floating debt of \$500,000, which, however, we hope to pay off as the accumulated iron is delivered and paid for.

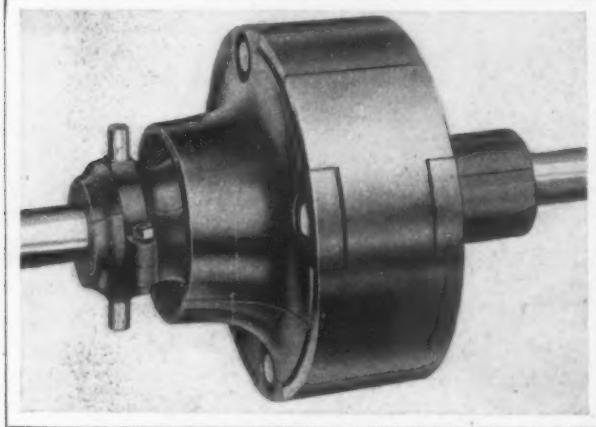
"The outputs of coal, coke and iron ore all showed a considerable increase during the year.

"There was spent at the coal mines \$203,000, of which amount \$44,800 was charged directly to the cost of coal.

"The iron mines produced in the year 491,000 tons of red ore and 218,800 tons of brown ore, an increase in the total production of ore of 72,700 tons. Two of the Irondale mines were in operation for only a limited time during the year, as the ore was not needed. Both the company's rent roll and the business done by the stores showed an improvement over the previous year."

A Split Safety Clutch for Shafting

The Carl L. Westlund Company, Worcester, Mass., has brought out a type of safety clutch in which the parts are split, so that they can be assembled on the shaft without the necessity of taking it down, and can be as readily removed if occasion



A Split Safety Clutch Which Can Be Placed on Shafting without Taking It Down

should require. The working mechanism is all inclosed, and screw heads and nuts are flush with the surface, in the interest of safety.

The clutch is of the friction type and the surfaces are maple wood and cast iron. The cams and links which bring the surfaces together or separate them are of steel and the working points are hardened. A perforated bronze self-oiling bushing in an extended sleeve is the standard practice for high speeds. The bushings run freely in the sleeve and

also on the shaft, with the exception of two short end bushings which are tight in the sleeve to keep the oil from running out.

For average speeds oil chambered cast-iron or bronze bushings are recommended. The split clutch is also adapted for use as a cut-off coupling and is made in sizes for shafts ranging in diameter from 1 9/16 to 4 7/16 in.

American Steel Foundries

The report of the American Steel Foundries for the year ended December 31, 1913, shows a much larger profit than for several years. The surplus carried to the profit and loss account, from which the dividends were paid, amounted to \$1,033,592, equal to 6.01 per cent. on the capital stock. The previous year the surplus amounted to only \$553,238, taking into account the deficit of 1911. Gross sales for 1913 aggregated \$17,425,941. Following is the income account, compared with the preceding year:

	1913.	1912.
Earnings from operation of plants after deducting manufacturing, selling, administrative and head and district office expenses.....	\$2,031,272	\$1,543,839
Other income	55,894	44,927
Total income	2,087,166	1,588,766
Interest on bonds	273,829	301,083
Other interest charges	4,460	72,165
Sinking fund charges	456,359	115,254
Depreciation	318,926	322,507
Net income	1,033,592	777,756
Previous surplus	533,238	224,518
Surplus	1,586,830	553,238
Dividends	343,680	.....
Profit and loss surplus	\$1,243,150	\$ 553,238

*Deficit.

The general balance sheet as of December 31 compares as follows:

	Assets.	1913.	1912.
Realty, patents, etc	\$20,267,005	\$20,032,009	
Real estate not used	298,630	298,630	
Sinking fund assets	161,153	39,804	
Bonds, notes, etc.	286,745	388,882	
Inventories	1,634,624	2,108,473	
Receivables	3,122,673	3,100,743	
Cash	1,070,937	229,438	
Insurance unexpired, etc.	34,089	25,794	
Total assets	\$26,875,856	\$26,223,773	
	Liabilities.		
Capital stock	\$17,184,000	\$17,184,000	
Bonds and debentures	2,325,300	2,414,000	
American Steel Casting bonds and debentures	3,092,800	3,436,800	
Accounts payable	756,737	863,157	
Payroll accrued	146,920	203,110	
Accrued interest	110,047	115,780	
Depreciation and renewal reserves	554,076	534,591	
Sinking fund	1,472,826	919,097	
Profit and loss	1,243,150	553,237	
Total liabilities	\$26,875,856	\$26,223,773	

President R. P. Lamont in his accompanying remarks says:

"At no time in the year did all of the plants operate at full capacity. The volume of orders on hand at the beginning of the year was large, but new business steadily declined, and by the end of the year the plants were operating at less than 50 per cent. of the total capacity.

"By far the larger portion of this company's business comes directly or indirectly from the railroads, and their purchases at the present time are much below normal, both for new equipment and for repairs. Unless the railroads get some relief in the near future in the matter of increased freight rates, the present year will not be a good one for business depending upon them. Our plants and organization were never in better condition to handle a large volume of business, but there is very little business in sight at the present time. Anything that our stockholders can do toward helping to bring about a more favorable attitude toward the railroads will directly benefit the company."

NEW FACTORY TRACTOR

A Self-Contained Piece of Apparatus for Handling Material and Hauling

No more important problem presents itself in the equipment and layout of industrial plants than the question of the transportation of materials. Every manufacturer finds it necessary to take into consideration the peculiarities of his product and the materials entering into it, the quantities handled and the number of times and the distance the materials must be moved. While

truck has a maximum rate of speed of about 6 miles per hr., will climb a 30 per cent. grade when loaded, and has ample battery capacity for a full day's operation.

As indicated in the illustration, the operator's platform and controlling levers do not detract from the load space of the truck. The control is particularly simple. Raising the foot from the foot pedal shuts off the current and sets the brake, thus stopping the truck and locking the pedal so that the truck can only be started again by first bringing the controller handle to neutral position. The braking effect possible to secure is



Two Views of a Recently Developed Storage Battery Industrial Truck Showing It Ascending an Incline and in Use in a Shop as a Tractor

special situations ordinarily suggest special handling equipment, most plants will find that the most flexible unit is the one best suited to the handling of the majority of materials around a plant. One of the contributions to such flexible types of transportation equipment is the shop truck in its various forms. The Electromobile Company, St. Louis, Mo., has perfected an industrial truck operated by self-contained storage batteries. It is made in three types varying in length of wheelbase from 42 to 54 in., with capacity to carry from 2000 to 3000 lb. and to haul, acting as a tractor, from 5000 to 10,000 lb. The

illustrated in the upper portion of the engraving, which shows a loaded truck standing at rest on a steep incline. Acceleration in the speed of the truck while in motion is effected by varying the pressure on the foot pedal. The truck is built very substantially and is arranged to turn in a short space, a feature which makes it particularly adaptable to the loading of materials into cars.

The truck is equipped with spiral steel springs and cast-steel wheels on which are solid rubber tires so that the truck is equally serviceable, both within the plant or for transportation of materials outside of the plant.

The Fluorine Process in the Open-Hearth

Cheaper Material May Be Used Than in the Converter—Method of Operation, with an Estimate of Cost

BY L. GOLDMERSTEIN*

In a previous article (*The Iron Age*, January 22, 1914, p. 250) the writer discussed the application of the fluorine process to the purification of steel in the Bessemer converter. There two main points have to be considered: 1. The impurity which gives most trouble is phosphorus. 2. The time for its elimination is very short. The salt used had therefore to be very positive and rapid in action, and this led to the consideration, in the first place, of manganese sesquifluoride, even though the comparatively high price of this salt made the cost results less attractive than they might otherwise be made to appear.

OPEN-HEARTH FURNACE PERMITS CHEAPER SALTS

In the open-hearth furnace the situation is materially different. The elimination of phosphorus can be managed on the whole better and in a more uniform manner than in the converter; on the other hand the trouble from the presence of sulphur has to be reckoned with. The length of operation is far greater, and that permits a longer period to be devoted to the elimination of impurities than is the case with the Bessemer converter. Further, the presence of a comparatively large amount of fluxes makes the liability to losses of the salt used for the purification greater than in the converter. All this led to the adoption for the open-hearth furnace of a cheaper salt, even though it would require more time to decompose—namely, fluorine salts of iron; iron fluoride anhydrous and iron sesquifluoride anhydrous. As in the case of the other salts used in this process, none of the above mentioned materials can be found in trade at present, and the author had to have them specially made for his tests, but their manufacture is so simple that it can be easily carried on on a large scale and give a very uniform and cheap product. As far as the writer has been able to establish, either the iron fluoride or the sesquifluoride may be used under conditions presumably existing in the open hearth.

Iron fluoride can be obtained by passing hydrogen fluoride (anhydrous) over red hot iron, preferably filings or shavings. Iron sesquifluoride may be obtained by passing over heated iron oxide, anhydrous hydrogen fluoride. Both operations may be carried out in large copper vessels water-cooled from the outside. As a ton of hydrogen fluoride will cost approximately \$12 and a ton of iron shavings, free from rust and impurities, not more than \$15 and very likely less, the final product, including labor, power and overhead charges, ought not to cost more than two cents per pound. In the following calculations we shall assume, however, for the sake of safety, that it costs 2.5 cents per pound. The sesquifluoride will cost approximately as much as the fluoride and will carry 50 per cent. more of fluorine for the same weight of material.

OPERATION OF THE PROCESS

The salt is introduced into the bath in iron cartridges. Since it is required that the salt should

penetrate through the entire metal mass as uniformly as possible, it is of advantage to use a large number of cartridges. The cartridges present the further advantage that the salt enclosed in them does not have the chance to take up moisture from the air. When the cartridge is melted, the salt, which by that time had become very hot, is liberated and strikes in the form of a vapor or liquid the molten metal mass. As fluorine has a greater affinity for phosphorus and sulphur than for iron, it will take up the impurities from the metal and form with them compounds which, at the temperature prevailing in the furnace, are gases. As fluorine has also a great affinity for silicon, fluxes containing the latter must not be used in connection with the fluorine process, or, if they are used, time must be given for the silicon to burn out before the fluoride is introduced.

A rather interesting point is the heat balance of the furnace when the fluorine process is used. In order to break up the salt into the metallic fluorine and iron, a fairly large amount of heat is consumed, so that had the salt been introduced in a lump there would occur a temporary local cooling, perhaps freezing, of the metal, as the writer has found many times in his crucible tests. But when the fluorine unites with the impurities, heat is given out, and since the amount of heat, positive or negative, involved in a chemical reaction is roughly proportional to the affinity between the elements, the amount of heat given off in the second part of the reaction is larger than that consumed in the first, so that in the end the addition of fluorides tends to raise the temperature of the bath.

The main advantages of the fluorine process in connection with open-hearth manufacture of steel lie in the ability of the fluorides to eliminate sulphur and in the fact that the elimination of all impurities takes comparatively little time. The final product is therefore of a higher grade of purity than could be otherwise obtained with the same equipment (i. e., without using subsequent desulphurization by special processes or in the electric furnace), while the time occupied in the manufacture of steel is made much shorter. The latter is due to the fact that a large part of the time during which the metal is made to stay in the open-hearth furnace is consumed not in steel manufacture proper, but in an endeavor to cook out the impurities, and a method of removing these impurities with certainty within a short time will, of course, correspondingly reduce the time required for the manufacture of the metal. But reduction of time during which the metal stays in the furnace means not only an important saving in fuel, but also a larger output per furnace unit and therefore a better utilization of the expensive steel plant equipment.

COST OF THE FLUORINE PROCESS

The fluorine process requires for its application no special machinery, so that the only expense to be considered is that of the materials used. Assume that the impurities to be eliminated are 0.1 per cent.

*29 West Thirty-ninth street, New York.

of phosphorus and 0.2 per cent. of sulphur, the pig iron used being of a cheap kind. On the whole we have, therefore, 0.3 per cent. of impurities to be eliminated, or 6 lb. per short ton of metal. To take care of this amount of impurities, approximately 6 lb. of fluorine are required; but as there may be losses of material, we assume that 8 lb. of metallic fluorine will be actually consumed. If we introduce the fluorine as iron sesquifluoride (Fe_2F_5), we use a salt which contains in each 225.8 units by weight approximately 101 parts of iron and 125 parts of fluorine; or, to obtain 8 lb. of fluorine we have to use roughly 15 lb. of the salt, which, as we have shown above, will cost when manufactured on a large scale 2.5 cents per lb. The total cost per ton is therefore 37.5 cents under the rather unfavorable assumptions with respect to the cost of the raw materials and losses made in the above calculations. Against this are to be placed the possibility of using a cheaper grade of pig iron, a better product, a saving in fuel and a higher degree of utilization of the plant equipment.

The process described has been protected by patent applications.

LIFE OF CUPOLA LININGS*

A Case Where Proper Treatment of the Bricks Had a Marked Effect

The following record of a cupola lining will be of interest to foundrymen, as an instance of the length of life attainable when the bricks are given proper treatment.

It is well known that even with the best qualities of fire-bricks for cupola linings, that is the highest refractory qualities combined with a fine grained structure to resist abrasion as well as chemical action through contact with the ash of the fuel, poor results are obtained when the bricks are laid with inferior clays for a mortar. The more readily fusible clays thus introduced between the best of bricks will start a slagging action within the range of the melting zone, and the result is a more or less rapid washing away of the lining. If, coupled to this, the daubing is also prepared with clays high in fluxing ingredients such as lime, oxide of iron, alkalies, etc.—and how many of our smaller foundries make use of local clay banks for this work—the result will be a necessary relining of the melting zone at very frequent intervals.

In the case presented herewith, the fire-bricks were laid without any clay mortar whatever. They were placed to within $\frac{3}{4}$ in. of the shell, and the space thus left filled with parting sand. Care was taken to have the joints as small as could be made. Charging the cupola was carried on with the ordinary care that should be given this work. The blast pressure ran from 12 to 15 oz., the melting rate was from $14\frac{1}{2}$ to 16 tons per hr., the cupola diameter inside the lining 66 in., and the melting ratio from 8.1 to 8.4 lb. iron per lb. of coke. From the above figures it will be seen that full returns were expected from the cupola, and the lining was not "nursed" by any means.

The lining was put in June 2, 1912, and no new bricks were put in until the cupola was again relined October 19, 1913, it being deemed inadvisable to take any chances. After the lining was out, however, it was seen that the cupola could have been run for another 100 heats safely.

As the castings to be made are all of the lightest character, consisting entirely of stove plate and hollow-ware, very hot iron is required. This condition is accentuated by the fact that after tapping into bull-lades holding about a ton each, the metal is carried to the different sections of the molding room, poured into hand ladles, and then into the molds. While the foreman gives some attention to the cupola daily, yet all the work about it is done by a set of green negroes.

The melting record of the lining is as follows:

	No. of days.	Lbs. of iron melted per month.
June	24	1,387,500
July	26	1,437,000
August	27	1,569,000
September	25	1,555,500
October	27	1,665,500
November	26	1,494,000
December	25	1,402,000
1913.		
January	27	1,555,500
February	24	1,410,000
March	26	1,580,000
April	26	1,605,000
May	27	1,579,000
June	25	1,493,000
July	26	1,572,000
August	26	1,618,000
September	26	1,630,000
October	16	998,500
Total	429	25,551,500
Total melt, 12,775.75 tons.		
Average melt per day, 29.8 tons.		

From the above it will be seen that where foundrymen have to reline the melting zone frequently, not to speak of the rest of the cupola lining, a little attention to the work in the first place, the exclusion of materials allowing fluxing action between the bricks themselves, careful chipping to remove slag that will continue to eat in further with every melt, and at the same time allow any daubing put on to slip off the moment the slag behind becomes soft—will result in maintaining the integrity of the lining for a surprising tonnage and length of time.

Recent Test of a Turbo Air Pump

A test was recently made on a turbo air pump, built by the Wheeler Condenser & Engineering Company, Carteret, N. J., with results indicating that it is possible to maintain a very high vacuum with it. Water at a temperature of 70 deg. F. was handled and with a load of 10 cu. ft. of free air per minute, the pump maintained a vacuum of 29.1 in. or 99.7 per cent. of the theoretically attainable vacuum. With a load of 18 cu. ft., the vacuum maintained was 29 in. The load was increased up to 65 cu. ft. and at this point the vacuum fell off to about 93 per cent. of the amount that theoretically could be obtained, the reading being approximately 27.1 in.

The design of this pump, which was illustrated in *The Iron Age*, June 12, 1913, is similar to one built by the Allgemeine Elektricitäts Gesellschaft, Berlin. It consists of a small high-speed impeller, a ring of diffusion channels and a casing. The impeller discharges water in separate streams into the fixed compression or diffusion ring. The blades of this ring cut the jets into a large number of plugs or layers, which close the entire section of the channels and force the entrapped air out against atmospheric pressure. Air is admitted to the center of the casing by a large nozzle on the bearing side of the pump and is drawn into the diffusor around the entire periphery of the impeller. It is pointed out that this arrangement gives a large capacity for a small diameter impeller, which rotates at very high speed, suitable for a direct-connected turbine drive.

The Hill Clutch Company, Cleveland, Ohio, manufacturer of power transmission machinery, announces the appointment of P. W. Alling as Eastern representative, in charge of its New York office, Hudson Terminal, 50 Church street.

*Contributed to the Proceedings of the American Foundrymen's Association by W. A. Griswold, Nashville, Tenn.

Death of George Westinghouse

George Westinghouse, the famous inventor and engineer, died of heart disease at his New York City residence March 12, aged 67 years. His health had been failing for some time but the mental alertness and wonderful energy that had so characterized his brilliant career remained with him to the end.

Mr. Westinghouse was born at Central Bridge, Schoharie County, N. Y., October 6, 1846. His paternal ancestors came from Germany and settled in Massachusetts and Vermont before the Revolution; his maternal ancestors were Dutch-English. His father was an inventor, who, in 1856, removed his family to Schenectady, N. Y., where he established the Schenectady Agricultural Works. The boy attended the public and high schools of the town, spending much of his leisure time, after studies, in his father's machine shop. Before he was 15 he had invented and built a rotary engine.

In June, 1863, though barely 17, he enlisted in the New York National Guard, and after a few months joined the Sixteenth New York Cavalry. The following year he accepted an appointment as third assistant engineer, United States Navy. At the close of the war, resisting solicitations to remain in the navy, he tendered his resignation and was honorably discharged August 1, 1865. Entering Union College, Mr. Westinghouse remained until the close of his sophomore year, when, according to Arthur Warren, he was advised by the president of the college to abandon classical studies and enter upon active life, as he knew as much of mathematics as he could be taught there and his career was plainly that of an engineer.

In 1865 Mr. Westinghouse invented a device for replacing railroad cars upon the track, which was manufactured for him at Troy, N. Y. Going to Troy one day a delay caused by a collision suggested to him the idea that a brake under the control of the engineer might have prevented the accident. His first attempt was an automatic brake attached to the couplers which was unsuccessful; this was followed by the use of steam, which proved also to be unsatisfactory. He then happened to read an account of the use of compressed air in digging the Mont Cenis Tunnel 3000 ft. from the compressor. Instantly the inventor saw the light. Drawings of an air pump, brake cylinder and valves were made, but considerable time elapsed before a practical trial of the brake was obtained. The first patent was issued April 13, 1869, the Westinghouse Air Brake Company was formed July 20 following and a small factory was built in Pittsburgh in 1870.

Mr. Westinghouse then went abroad to introduce the air brake in England, which was a difficult problem. Not only did this absorb his time for several years, but it taxed his inventive ability considerably to meet the different conditions of railroad practice. In the meantime he invented the

automatic feature of the brake which removed the danger from the parting of trains on steep grades. In 1886 he invented the quick-action brake, with its triple-valve. By this valve it became practicable to apply all brakes on a train of 50 freight cars in two seconds. The automatic and quick-action brakes are regarded by experts as surpassing the original brake in ingenuity and inventive genius, being not mere improvements but distinct inventions of the highest class, unique and remarkable.

About 1880 Mr. Westinghouse became interested in the operation of railroad signals and switches by compressed air, and soon after there was developed and patented the system now manufactured by the Union Switch & Signal Company, whereby all the signals and switches are operated from a given point, using compressed air as the motive power and electricity to bring that power into operation.

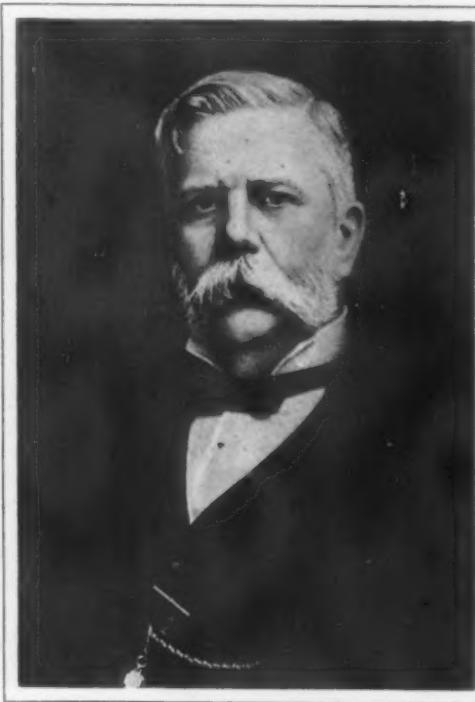
In 1886 the Westinghouse Electric Company was formed for the manufacture of lamps and electric lighting apparatus, Mr. Westinghouse having turned his attention in that direction. The business rapidly developed, and in 1889 and 1890 this company absorbed the United States Electric Company and the Consolidated Electric Light Company. In 1891 all these properties were reorganized into the Westinghouse Electric & Mfg. Company.

The question of the steam turbine and its applications was investigated by Mr. Westinghouse and he secured for this country the patent rights of Charles A. Parsons, of England, on the turbine in 1897-8. His study of this new prime mover soon led the inventor to consider its use for ships. The trouble was the high speed. Mr. Westinghouse then developed and brought out one of the most ingenious achievements of modern mechanical engineering. This was the mechanical reduction gear for reducing the inherently high speed of a turbine to the slow speed of a ship propeller. He accomplished this

work in collaboration with the late Admiral George W. Melville and John H. MacAlpine. Within the last few years he also occupied himself with the development of an air spring for automobiles and motor trucks which rapidly came into favor.

Mr. Westinghouse rendered an invaluable service to the electrical development of the world when, in spite of all efforts to crush his alternating current system, he remained steadfast in his belief that this class of high-tension transmission would make distant electrical distribution possible. This system his engineers developed, and incidentally in this connection he secured Nicola Tesla in 1887, who invented the alternating-current induction motor. The world today, lighted by distant waterfalls and central stations, recognizes its debt to Mr. Westinghouse's foresight and perseverance.

The value of natural gas to the manufacturing industries of Pittsburgh was first foreseen by Mr. Westinghouse, who organized a company to develop this vast resource of Pennsylvania and met in characteristic fashion the engineering problems.



GEORGE WESTINGHOUSE

Chance has had no place in the success of this man. It has been due to his foresight, courage, technical skill and natural endowments. He had a highly developed mathematical mind and a memory so retentive and accurate that he needed no note book. As with his first great invention, the air brake, the different kinds of apparatus have been developed to answer actual needs. When the apparatus had passed the experimental stage and was ready for commercial exploitation, he established factories which are themselves models and which show the same anticipation of future development. Not only are the buildings handsome and well equipped with the best tools, but the comfort of the employees has been considered in every respect.

Owing to his achievements in mechanics, electricity, steam and gas, his name became known throughout the world and he had many honorable distinctions conferred upon him in recognition of the services he rendered the various branches of engineering. He was president of the American Society of Mechanical Engineers in 1910.

Mr. Westinghouse was connected with a large number of industries at home and abroad, many of which bear his name. The Westinghouse companies employ 50,000 men, on whom 150,000 persons are dependent. The total capitalization of all the companies is \$200,000,000. He leaves a widow and one son, also named George.

Mr. Westinghouse had begun in the last few years to transfer his responsibilities to the shoulders of trusted lieutenants, the fortunate selection of whom has always been one of the leading characteristics of his varied career. His demise, therefore, will not cause any material change in the policy or operation of the companies so indelibly linked with the name Westinghouse.

The Otto Coking Company, Inc.

The Otto Coking Company, Inc., has been formed to operate in the United States and on March 1 took over the organization, assets and good will of the Schniewind Coke Oven Company, the United Coke & Gas Company, the German American Coke & Gas Company and the American Coke & Gas Construction Company. The Otto Coking Company is controlled by the interests in Dr. C. Otto & Co., Dahlhausen a. d. Ruhr, Germany, and the Otto By-Product Coke Company, Leeds, England. The object is to introduce into the United States the Otto regenerative by-product coke oven, with direct recovery of ammonia, tar and benzol. The new company starts out with a contract for the immediate erection of a plant for the Buffalo By-Product Coke Corporation at Lackawanna, N. Y., near Buffalo, and there are several negotiations now going on for other plants.

Dr. M. G. Christie, Leeds, England, is president of the new corporation. He will spend about half his time in this country. Dr. C. Otto will be assistant to the president and will shortly take up his permanent residence in the United States. Dr. Otto is the son of the inventor of the original Otto oven. The vice-president and general manager will be Louis Wilputte, a well known coke oven engineer. The secretary and treasurer will be George F. McKay. Temporary offices are at No. 6 Church street, New York, where the company occupies the seventh floor.

As the result of two years of experiment, the county highway commission of Ashland County has made a contract with the Lake Superior Iron & Chemical Company, Ashland, Wis., to purchase all of the slag from its blast furnace produced in 1914 at \$11,124. The roads which have been built with slag are believed to be practically indestructible. In southwestern Wisconsin the slag from the lead and zinc furnaces has been used for several years for the same purpose with excellent results.

Bethlehem Steel Corporation

The Bethlehem Steel Corporation enjoyed by far the most profitable period in its history in the fiscal year ended December 31, 1918. Net profits from operation of its plants and investments totaled \$8,752,671, as compared with \$5,114,440 in the preceding year and \$4,792,713 in 1911. There was left for dividends \$5,122,703, equivalent to 27.44 per cent. on the common stock after allowing for the 5 per cent. dividend paid on the preferred.

Orders booked during the year amounted to \$39,935,874, against \$47,030,504 in 1912, and on January 1, 1914, the company had unfilled orders of \$24,865,560, against \$29,282,182 a year previously. The average number of men employed in the plants in this country was 15,052, and wages paid amounted to \$13,366,399, an increase of nearly \$3,000,000 over the previous year. Following is the income account, compared with the preceding year:

	1913	1912
Net manufacturing profit.....	\$8,530,708*	\$4,846,814
Other income	221,963	267,626
Total income	8,752,671	5,114,440
Interest on notes, etc.....	137,164	159,437
Interest on funded debt.....	1,964,020	1,844,478
Depreciation	1,272,270	790,578
Funds for extinguishment of mines, amortization of patents, etc.....	256,516	256,306
Surplus	5,122,703	2,063,640
Preferred dividend	745,400	.....
Balance	4,377,303	2,063,640
Discount on securities	3,180,740	854,354
Balance	1,196,563	1,209,286
Previous surplus	1,017,954	7,308,668
Total surplus	2,214,517	8,517,954
Appropriated for additions and work- ing capital .....	.....	7,500,000
Profit and loss surplus.....	\$2,214,517	\$1,017,954

*After deducting expenditures for ordinary and extraordinary repairs and maintenance, approximately \$3,003,000.

The balance sheet as of December 31 compares as follows:

	Assets	1913	1912
Property account	\$72,891,695	\$63,401,132	
Funds with trustees	34,461	32,739	
Inventories	10,206,734	8,776,579	
Notes and accounts receivable.....	9,909,956	6,534,429	
Miscellaneous investments	365,372	232,255	
Cash	1,963,281	2,020,346	
Deferred charges	227,800	3,421,461	
Total	<u>\$95,599,300</u>	<u>\$84,418,952</u>	
	Liabilities	1913	1912
Preferred stock	\$14,908,000	\$14,908,000	
Common stock	14,862,000	14,862,000	
Funded debt	33,599,033	32,441,533	
Notes and accounts payable.....	9,642,813	5,553,741	
Bond interest	483,307	450,605	
Reserve for depreciation, etc.....	9,586,010	6,680,312	
Reserve for relining furnaces, etc.....	2,803,119	1,004,806	
Appropriated from surplus	7,500,000	7,500,000	
Surplus	2,214,517	1,017,954	
Total	<u>\$95,599,300</u>	<u>\$84,418,952</u>	

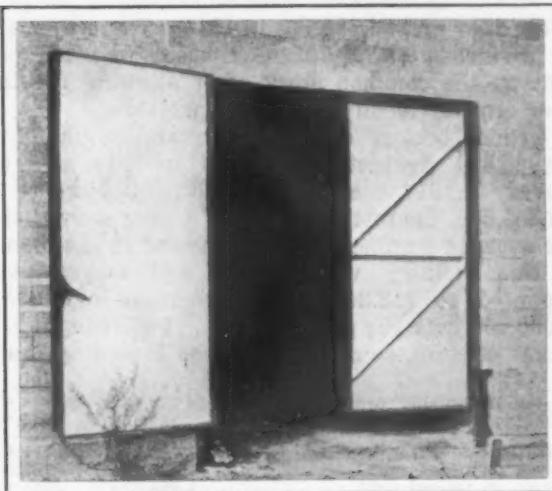
President Charles M. Schwab, in his accompanying remarks to stockholders, made the following reference to the corporation's newly acquired Chilean ore property:

"Throughout the year careful consideration has been given to the great engineering problems connected with the development of the ore mines, and satisfactory plans for economical mining are now in shape and the actual work will be vigorously prosecuted. The explorations carried on during the year have shown evidences of quantities of ore even greater than heretofore anticipated, and the large expenditures that must be made for the proper development of these properties are therefore fully warranted."

Regarding the Bethlehem Steel Company's works, President Schwab states that an elaborate construction programme is under way which includes additional furnaces, mills and shops that will add materially to the output and the earning capacity of that subsidiary.

Cement Doors at Minnesota Steel Plant

At the plant of the Minnesota Steel Company, Duluth, concrete has been turned to a large number of uses which are novel not only in steel plant con-



Steel Frame Door with 1½ In. Thickness of Cement

struction but elsewhere as well. At this plant most of the smaller doors are of concrete paneling on a steel skeleton.

The units are 4 ft. 9 in. by 10 ft. 3 in., and comprise a steel skeleton with rib-metal panels plastered with Portland cement mortar to a thickness of 1½ in. Their structure is evident from the illustration. The outer frame is of 3-in. channels, the central cross brace of two ¼ x 1½-in. flat bars and the two diagonal braces of ¾ x 1½-in. flat bars. To the inner web of the channel ½-in. Ferro-in-Clave is riveted and No. 24 gauge expanded metal is bent around and tied to the braces. This completes the door until hung. When in place the panels are plastered to a thickness of ¾ in. on each side of the metal web. Along the channels and braces the mortar is the full thickness of the door, 3 in. and beveled. The door is easily erected, as the unplastered frame is readily aligned and hung and the later addition of panels tends only to strengthen the frame and prevent distortion. While the doors have considerable inertia due to their weight, they are readily operated by one hand.

A Factory Safety First Bulletin

Some good suggestions on the Safety First movement may be obtained from a bulletin issued by Frank F. Skillman, superintendent of the Procter & Gamble Mfg. Company at Kansas City, Kan., for posting throughout the factory. The bulletin is done in typewriting in red and green inks and in capital letters. The italic lines in the subjoined copy of the bulletin represent the green lettering and the others the red lettering. At the head of the sheet is drawn a 3-in. circle of green, with the usual equal-leg cross in the center, uncolored, and the words "Safety First" in red on the white cross. The injunctions of the bulletin are as follows:

Don't take chances of getting injured.

You will probably live longer and feel better.

Don't let your men take chances.

You will feel better, and probably they will.

Don't let a new man take chances.

Show him or tell him how to play safe.

Remember you had to learn once.

Don't let men from outside departments take chances in your department.

Call their attention to the danger or call your foreman's attention to it.

Your warning may be their salvation.

Don't try to do things you don't know how to do.

Ask your foreman to show you. Get started right.

It will be better for you and cheaper for the company.

Don't worry with machines or apparatus out of order.

Report them and have them made safe.

Life is too sweet to spend part of the time in a hospital.

Don't go into dangerous places without proper safeguards. And don't go into them at all unless it is part of your duties or necessary to save life or property.

Be a hero, but don't be foolish.

Don't forget to keep your tools, machines and departments clean.

This will often help you to see danger in time to avoid it.

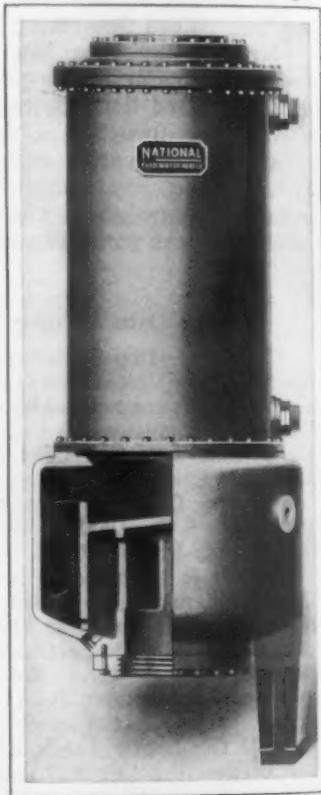
Neatness and cleanliness is a habit. Cultivate it.

Don't ride on the switch engine.

A two-minute ride for a wooden leg is a poor exchange.

A Feed Water Heater and Oil Separator

To facilitate the installation of apparatus for heating feed water and keeping it free from oil, the National Pipe Bending Company, 164 River street, New Haven, Conn., has made a special closed type of heater, with the separator forming an integral part of it. The separator is placed at the bottom of the heater, so that the exhaust steam will impinge upon the baffles and by change of direction and passing through the ports shown will be freed from particles of oil without adding to the back pressure on the engine. The design of the heater is only a slight modification of the company's regular horizontal oil separator, the distinctive features being the individual baffles and the arrangement of ports which have an area one and one-half times greater than that of the inlet pipe, the former being shown in the engraving.



A New Combination Closed Feed Water Heater and Oil Separator In Which the Latter Is Located at the Bottom of the Heater

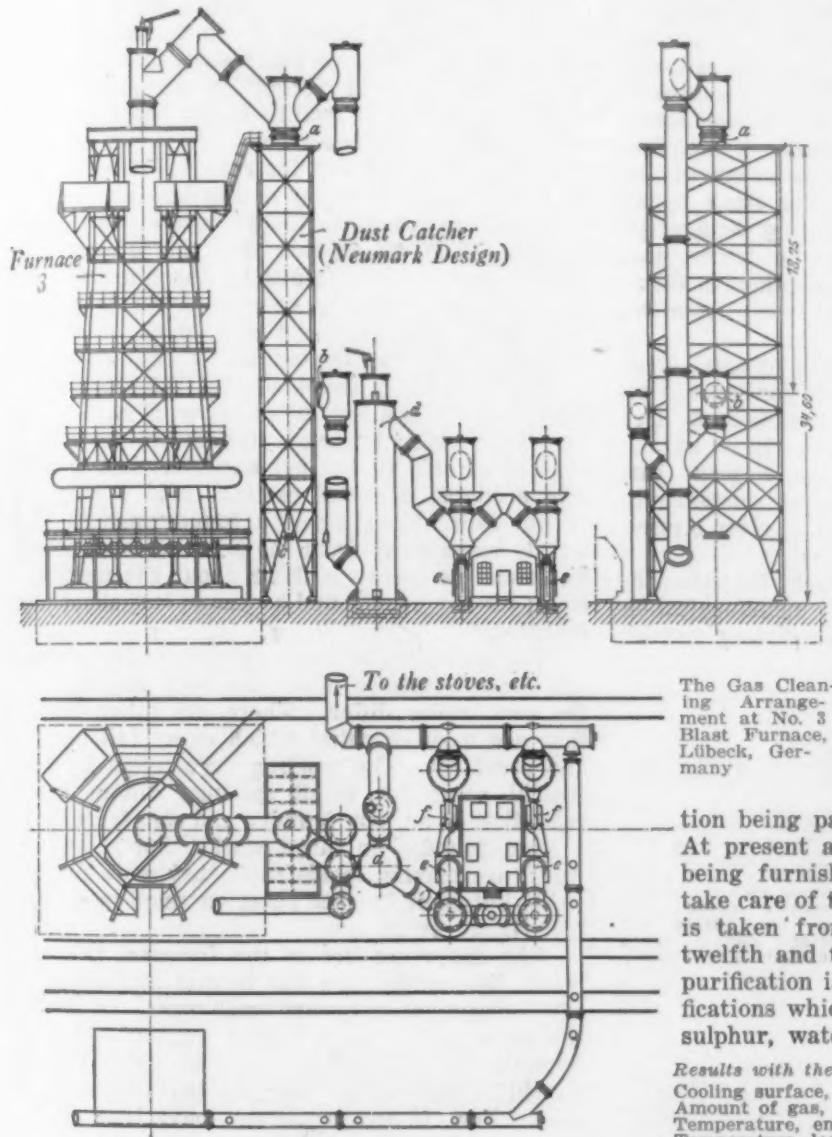


The Chicago Scrap Material Company, 156 to 160 North Sangamon street, Chicago, has purchased and intends shortly to wreck the Chicago City Railway plant, known as the Hobbie street power house, and all the material will be offered for sale. This plant consists of four units, comprising one 1500-kw. General Electric generator, direct connected to an Allis-Corliss cross compound engine and three 800-kw. General Electric generators, direct connected to an Allis-Corliss cross compound engine, of heavy duty type, with ten 300-hp. water-tube boilers, a 25-ton electric traveling crane, and much miscellaneous material. The company intends to make a specialty of dismantling plants of this kind and is contemplating going out of the ordinary scrap business.

GERMAN BLAST FURNACE PLANT

New Construction at Lübeck — The Neumark Differential Dust Catcher

An article describing in detail the new construction of the Lübeck blast furnace plant, Lübeck, Germany, appears in the issues of *Stahl und Eisen* for Dec. 11 and 18, 1913. It is particularly interesting because of the description given of the whole plant, one that is designed primarily to furnish all kinds of ordinary and special pig irons. The greatest care however is given there to working up the



by-products which receive equal attention to the main product. This is especially true of the blast-furnace and coke-oven gas, about 350,000 cu. ft. of the latter being supplied each 24 hr. to the municipality of Lübeck for illuminating gas.

Other products derived from the coke oven plant are benzole, tar oils, pitch, naphthalin and of course ammonium sulphate. The blast furnace slag is worked up into slag bricks, but more particularly into eisen-portland cement. There is also an excess of coke which is sold in the open market.

Several features of the new construction are worthy of mention. The harbor has been enlarged, and a fifth bridge and unloader added to the ore dock. A third blast furnace has been built, which is described in great detail. Its output is 230 tons in 24 hr. American design has evidently been kept

in mind when planning this new furnace. The gas cleaning system is a noticeable feature, the Schwarz-Bayer method being used in connection with the Neumark differential dust catcher. A drawing of this catcher is shown in the illustration. The dirty gas from the blast furnace enters at *a* and flows vertically downward. The velocity of the gas is immediately decreased because of the larger section of the box and becomes less than that of the dust particles. The gas is also greatly cooled by the walls of steel plate, whereby the velocity is still further reduced.

The dust falls with increasing speed, due to the action of gravity, into the dead space below the opening *b*, through which the cleaned gas passes. The dust collects in the hopper shaped bottom and is continuously withdrawn at *c* by a screw. The creation of the dead space below *b* prevents the separated dust from being stirred up by the outgoing gas. The efficiency of this dust catcher with its large cooling surface and small space requirements is very good. Average results are shown in the table. From this dust catcher the gas enters the Schwarz-Bayer disintegrator.

The coke oven plant has also been enlarged about 50 per cent., a battery of 45 Otto regenerative ovens having been built. These ovens are described in detail. The coke is quenched with sweet water which is collected, filtered and used again. Each oven takes about 9 tons of coal, and the coking time is about 32 hr. The condenser house arrangements are also illustrated and described, particular attention

being paid to the illuminating gas plant. At present about 350,000 cu. ft. per day are being furnished, but the plant is designed to take care of three times this amount. The gas is taken from the ovens chiefly between the twelfth and twentieth coking hours, and after purification is supplied to the city under specifications which require technical freedom from sulphur, water, tar, ammonia and naphthalin.

Results with the Neumark Differential Dust Catcher	
Cooling surface, about.....	17,250 sq. ft.
Amount of gas, per min.....	23,500 to 28,500 cu. ft.
Temperature, entering.....	200 to 250 deg. C.
Temperature, leaving.....	120 to 160 deg. C.
Drop in temperature.....	80 to 90 deg. C.
Dust contents, entering.....	21.85 grs. per cu. ft.
Dust contents, leaving.....	2.18 grs. per cu. ft.

Finally, descriptions are given of the tar distillation plant and the new cement plant where blast furnace gas is used to dry the granulated slag and limestone, and coke-oven gas in the rotating kilns to clinker the mixture. The power used is electricity generated by gas engines. It is designed for a yearly production of 50,000 tons of cement, which takes the slag from two furnaces. The slag from the remaining furnace is used for necessary filling and grading, and making new land. Drawings are also given of the houses built for the increased number of workmen required. They are in blocks of 4, 6 and 8: 76 being built altogether, at an average cost of 4000 marks. Each one is provided with about 180 sq. yd. of garden space, right at the house.

G. B. W.

Small Steel Castings as a Specialty

Manufacturing Processes Compared and the Molding, Finishing and Furnace Departments Discussed—Dry Versus Green Sand Molds

In a paper read before the Pittsburgh Foundrymen's Association, Pittsburgh, Pa., Monday evening, March 9, C. S. Koch, president of the Fort Pitt Steel Casting Company, McKeesport, Pa., discussed "Some Features in the Manufacture of Small Steel Castings as a Specialty." He confined himself to castings of $\frac{3}{8}$ in. metal line and under, weighing not over 50 lb. each, and excluding so-called railroad car castings. He discussed the subject under three different heads: 1. The production of the steel. 2. The molding and core departments. 3. The finishing department. The processes he reviewed are the converter, the crucible and the small open-hearth (about 5 ton) furnace, excluding the electric furnace as not as yet a determining factor, and ignoring small castings made by open-hearth foundries producing large castings. Extracts from the paper are the following:

The fact that the largest number of small steel castings are made by the side-blow converter does not in itself prove that this is the best method. The best method must necessarily embrace in its advantages, not only those which make a plant run smoothly, but also those in which your customer is interested. However, neither must be given a place too far ahead of the other.

Viewing the three processes from the commercial aspect, but not from a strictly metallurgical or theoretical angle, the following comparison may be made:

Advantages Disadvantages

Converter Process (Side Blow)

1. Medium cost of steel, less than crucible, but more than open hearth.
2. Large tonnage per furnace, in fact largest of all.
3. This large tonnage is of great value to a foundry, in that it can be produced during the working day, while in other processes, some metal comes to the foundry during the night turn.
4. Great range in carbons, especially in respect to low carbons, which are becoming a very interesting subject to engineers.
5. Metal hotter than open hearth and probably as hot under like conditions as crucible steel.

Crucible Process

1. Well adapted for small installations.
2. High cost of steel.
3. Small tonnage.
4. Variable carbons, especially the difficulty with low carbons.

Open-Hearth Process, say 5-ton Furnace

1. Low cost of steel.
2. Comparatively simple metallurgical operation.
3. Not complicated in its mechanical operations.
4. Metal not as fluid, especially with low carbons.
5. Metal delivered to foundry usually throughout 24 hours, instead of 10 hours.
6. Unless several furnaces are at hand, the foundry will periodically be shut down during the time required for relining.

This comparison refers to the average foundry, to operations day in and day out with ordinary skill, and omits entirely any deep theoretical considerations. My remarks are based on nothing but what has actually been observed in the trade of manufacturing small steel castings as a specialty. The

comparison, which is only an outline, refers only to what has been found practical under ordinary conditions.

QUALITY OF STEEL DEPENDENT ON OPERATORS

As to the quality of the steel produced by the various methods I believe it can be said, without contradiction by anyone who knows, that, taking all data obtainable and forgetting all preconceived ideas, the matter of quality is not one entirely of process, but one of operators. It is not so much which process has made the record in tensile tests, etc., but what process, day in and day out, gives the best uniform results to the producers and the customers. It is my opinion that this desirable result is most often obtained by the converter, and also that the converter has the power to produce very easily low carbon steels which show tests heretofore thought impossible by engineers.

It is ordinarily supposed that the phase of the steel foundry business most essential is the making of the steel; however, such is not the case. I have often said it was not one-fifth; last week an able producer of small castings said it was only 10 per cent. Many times a foundryman in other metals keeps away from the steel business because he thinks he knows nothing about the making of steel; usually he will find he knows less about other features.

The difference between a cupola or iron furnace and a steel furnace is not the only way in which the two trades differ. There are other features that are most essential which many fail to grasp and profit by. The molding department in a successful plant for small castings differs greatly from that in an iron foundry and also from that in a steel foundry in large work. Some, on small work, are making molds as if they were for large work, but their balance sheet on small work would not satisfy every one.

The difference lies in the foreman, the equipment, the molder and the mental attitude of the whole organization toward small work. Of the four, the latter is by far the most important, but perhaps the most difficult to see. The inability to realize this, however, has been the cause of many failures. Few, if any, successes, have been made in small work by companies making large work, branching out into small work. These companies appeared to have every advantage—money, acquaintance, reputation—in their favor, but few have shown any great success or their success is nothing as compared with those who were not previously on large work. The mental attitude toward work is essentially the vital difference. Tonnage must be forgotten, sales price and profit are figured so much per man and any other way is ruinous. The differences in foremen, equipment and molders are more evident, but should not be lost sight of.

GREEN VERSUS DRY SAND MOLDS

Only one feature of the molding end will be discussed, the old, old question of green sand as compared with dry sand molds. You may be interested to hear that as far as can be estimated a larger tonnage of small castings is made in green than in

dry sand (there are no figures to prove this) irrespective of the use to which the castings are to be put. I am speaking of small castings machined all over, and under the severest inspection.

The points in favor of the green sand mold, referring both to the plant manufacturing them and the consumer of castings made from them are:

1. Eliminates cost of drying, both fuel and handling, especially the latter.
2. It is a more rapid system, turning out a greater product per unit of area.
3. In snap work the cores usually get only one baking.
4. In other than snap work, the flask equipment is cheaper, and is kept in much better condition.
5. Because of its yielding qualities certain designs can be made in a green sand mold, not possible in a dry mold. This is in itself an advantage, but in addition to this is the fact, that castings made in a green mold do not have the same strains produced, which, in the final casting may remain simply as strains, or may be in the form of a crack, not visible to the eye. For this reason if I were a purchaser of castings, I would want all intricate designs made in a yielding mold. This is a point few have grasped. They know they find green sand castings satisfactory but do not know why they are so. The points against are:

1. More skill is required on the part of the molder, and this is very serious for several reasons—the molder is higher priced; it takes longer to make a molder, and the number of possible operatives is less. Hence in busy times it is more difficult to get up to maximum production. In other words, one is not as independent as regards labor as if dry sand molds were being made.

2. Under equal conditions the rejections at the plant constitute a higher percentage. This is primarily due to misruns, for it is evident that a given metal will not run in a green mold as well as a dry mold. Corners of molds will drop off producing imperfect castings and also the resulting sand will show up in the casting. Oversized castings may result due to strains from molds rammed too loosely, which is a great disadvantage. The much discussed blow-holes, due to molds rammed too tightly, are generally considered the all important point, but strange to say it should not be, or better, it is not necessarily so. It is granted that without proper care, more blow-holes will appear from a green mold, and hence it is placed here under the heading of a disadvantage.

I believe truly that the percentage of castings rejected and returned is no greater in the green sand foundries than in dry sand foundries. There are times when a difficult casting is given to a molder of insufficient skill with bad results, but this in itself does not condemn green work.

HEADING AND GATING

Another feature of the molding end of small steel castings is the heading and gating. The heads and gates are excessive, and you may be interested to learn that when the percentage of good castings to total melt is 45 per cent. the practice is about normal on small work. The real essential in the molding end, is ability to rig cheaply. If molds are made as they are in large work, the tonnage produced is so low that the cost mounts and the sales price with it.

THE CORE DEPARTMENT

This is possibly the most neglected end of the business. Except in certain malleable and gray iron foundries, the core rooms are not run with any degree of efficiency. The reason given by most managers for this state, is that they have no repetition work; that is, the numbers from a given pat-

tern do not warrant them to do any rigging or to adopt any particular system. This reason sometimes holds good in the molding end but it does not in the core end. After reviewing my own experience and comparing it with others, I am of the opinion that the great majority of foundries are getting less for a dollar in core room than elsewhere.

Core boxes are naturally divided into two classes; one in which the ramming requires the skill, the other in which the lifting of the box requires the skill. Machines for both purposes are made and lately one has come out that will do both; that is there are jarring machines, there are drawing machines and now those which perform both operations.

THE FINISHING DEPARTMENT

More money can be lost or saved in the molding end and finishing room than in the furnace department in the production of small steel castings. It is very probable that the molding end is the most important factor, but the finishing end runs a close second.

The various operations can be quickly enumerated, and it will still be hard for one to see where the difficulty lies. Heads and gates are removed in various ways, probably the greatest tonnage by cutting-off machines; followed by the simple hand cutter with a second man on a sledge and last by saws of various kinds. The remaining operations are rumbling or sand blasting, grinding, annealing, repairing by some sort of welder, finishing, straightening in many cases and finally inspection. In many small castings, the cost per ton is greater in this department than is the cost in the molding department.

The making of small steel castings has not been a business conspicuous by any great successes, but on the other hand has been marked by many failures, and had these latter been on a large scale, the fact would have been impressed on the minds of all. As these failures have so frequently been by small companies, or have been only a part of some large concern, not materially affected thereby, they have been overlooked.

In the Pittsburgh district within the last seven years there have been nine new companies, only two of which are in existence to-day, omitting one recently started. That means that there has been one failure each year and only two successes in seven years. What has caused these failures, not only in the Pittsburgh district, but in the country at large? This is best answered by the following summary of difficulties:

1. Most new plants for making small castings have used the side-blow converter. In hands unskilled and in hands too economical, this process will surely be a factor against the production of profits.
2. The molding has been carried on as if small and large castings can be handled alike.
3. Very often too little money has been considered necessary and in most cases what money was at hand was not properly distributed over plant, equipment and working capital, usually too much being put into plant account.
4. No cost system worthy the name.
5. Organizations run on a scale too economical, and hence few, if any, realized the high cost of manufacture and high over-head charges, since they had no good cost system.
6. Castings sold at too low a price.

The first four of these causes are more or less self-evident, but the fifth and sixth are ones which contain many points and to which there are many ramifications, the subject of a paper by itself.

The Heat Efficiency of the Open Hearth

A Comparison of Four Important Foreign and Domestic Investigations—Loss by Radiation and in Waste Gases

BY GUST. FISK

Only during the recent years have any serious efforts been made to improve materially the heat efficiency of the open-hearth process. The utilization of waste heat has made good progress, but a very considerable heat loss, due to radiation, remains to be overcome. Investigations have been made in this country as well as abroad to determine the heat balance of the open-hearth furnace. In making the tabulation here presented the object has been to bring the results of these investigations, as far as possible, to a common basis for comparison.

The heat balance arrived at by Sidney Cornell is based on a heat efficiency test made on two furnaces at the Duquesne Works of the Carnegie Steel Company. The test was conducted under ordinary working conditions and covered a period of one week. Twelve heats were made in one of the furnaces and 11 heats in the other. The average production per heat was 70 tons. The average charge per ton of ingots ran as follows:

Hot metal	1120 lb.
Pig	96 lb.
Scrap	844 lb.
Ore, scale, lime, etc.	499 lb.
Additions of hot metal, ferromanganese, etc.	177 lb.

On the basis of experimental investigations Fr. Springorum has determined the heat utilization and the heat losses in a furnace operated on the Hoesch principle, according to which the heats are

divided into two periods. At the end of the preliminary period the intermediate product is tapped into a ladle, from which the slag is then poured off. Having charged the furnace with scrap, lime and ore for the second period of the heat, the metal is poured back into the furnace and is rapidly finished into steel, due to the strongly oxidizing effect of the new slag. The heat balance, as per table, applies to a total charge for both periods of the following:

Hot metal	23.3 tons
Ore	3.5 tons
Scrap	5.4 tons

The duration of the heat was five hours, including the intermission between the two periods; 30 tons of steel were produced.

Discussing the utilization of waste heat from open-hearth furnaces Thomas B. Mackenzie figures the heat balance for a furnace working with cold metal. A charge for the production of 54 tons of steel is made up as follows:

Pig	35.0 tons
Scrap	18.5 tons
Ore	6.5 tons

To obtain a basis on which to figure the heat balance Mr. Mackenzie proceeds as follows:

The weights of the constituents of the steel and slag which would result from the supposed heat are subtracted from the weights of the respective elements charged into the furnace. The differences

HEAT BALANCE OF THE OPEN HEARTH INCLUDING REGENERATORS AND FLUE TO STACK

Heat Delivered or Generated in Furnace per Ton of Steel Produced:

	SIDNEY CORNELL(a)	FR. SPRINGORUM(b)	THOMAS B. MACKENZIE(c)	FR. VON HOLT(d)				
	1000 B.t.u.	Per cent	1000 B.t.u.	Per cent	1000 B.t.u.	Per cent	Per cent	Per cent
Heat in iron	494		760				14.31	
Heat in ore, lime and scrap	9		4				.03	
Total heat in materials charged		503 6.06		764 8.6		7 .06		14.34
Sensible heat in gas		830 10.0		1239 14.0		1,260 10.7		7.6
Sensible heat in air		100 1.21		20 .2		28 .24		.8
Heat by combustion of gas		5793 69.8		5438 61.5		9,100 77.5		60.16
Heat by oxidation of C	623		850					
Heat by oxidation of Si	184		78					
Heat by oxidation of Mn	58		70					
Heat by oxidation of P	36		348					
Heat by oxidation of S	172		5					
Heat by oxidation of Fe			36					
Total heat generated by oxidation		1073 12.93		1387 15.7		1,360 11.5		17.1
Total heat generated in furnace		8299 100.0		8848 100.0		11,755 100.0		100.0

Heat Expended per Ton of Steel Produced:

	SIDNEY CORNELL(a)	FR. SPRINGORUM(b)	THOMAS B. MACKENZIE(c)	FR. VON HOLT(d)				
	1000 B.t.u.	Per cent	1000 B.t.u.	Per cent	1000 B.t.u.	Per cent	Per cent	Per cent
Heat absorbed in reduction	751		730		790		10.6	
Heat absorbed in slag formation	373		639		895		3.9	
Heat absorbed in melting steel	1289		1414		2120		20.5	
Total heat used in useful work		2413 29.08		2783 31.5		3805 32.3		35.0
Heat lost by radiation:								
Furnace proper	566							
Regenerators	1168							
Flue to stack	287							
Total heat loss by radiation, etc.		2021 24.35		3134 38.8		4450 37.0		42.6
Heat in waste gases		3365 46.57		2631 29.7		3500 29.8		22.4
Total heat expended		8299 100.00		8848 100.0		11,755 100.0		100.0

(a) Results of heat efficiency test made on two 60-ton furnaces at the Duquesne Works of the Carnegie Steel Company. For particulars see Metallurgical and Chemical Engineering for May, 1913, p. 257.

(b) Results of experimental investigation of a German 30-ton furnace operated on the Hoesch process. For particulars see Stahl und Eisen of March 9, 1910, p. 407.

(c) Figured values for a 54-ton heat. For particulars see "Transactions of the Institute of Engineers and Shipbuilders in Scotland," Vol. 54, p. 289; also Stahl und Eisen of March 7, 1912, p. 406.

(d) Results of investigations at Georgs-Marien-Hütte. For particulars see Stahl und Eisen of Dec. 18, 1913, p. 2093.

represent the weights of the constituents of the waste gases. Assuming the duration of the heat to be 16 hr. the weights drawn off by the stack per hour are determined. These weights are multiplied by the average specific heats of the respective constituents. By adding the products thus obtained Mr. Mackenzie arrives at a total heat waste per hour per degree F of 10,950 B.t.u. Assuming the average temperature of the waste gases to be 1080 deg. F. above that of the atmosphere, the heat carried off by the waste gases per ton of product is thus shown:

$$\frac{16 \times 1080 \times 10,950}{54} = 3,500,000 \text{ B.t.u.}$$

On the basis of this figure the heat balance is derived.

For the sake of comparison the results of investigations by Fr. von Holt at Georgs-Marien-Hütte, Germany, have also been included in the table.

It is interesting to note the uniformity of the results obtained by the different investigators in regard to efficiency. As seen from the table, the heat efficiency of the open-hearth furnace is only about 32 per cent. On an average about 36 per cent. of the total heat supplied is lost in radiation, while the remaining 32 per cent. escapes with the waste gases.

New Rules for Steel Castings

New specifications for steel castings, 49S1a, have been issued by the United States Navy Department under which the new dreadnoughts and other boats are being constructed. There are one or two radical departures from the rules under which former vessels have been built. Class B steel, which is the mild grade of the large majority of the castings, formerly called for a minimum tensile strength of 65,000 lb. per sq. in. with no maximum limit, the elongation in 2 in. being 20 per cent. The new specifications are changed to a minimum tensile strength of 60,000 lb. per sq. in. with a maximum of 80,000 lb., the elongation being raised to 22 per cent. in 2 in. This is to guard against the possibility of high carbon steel being accepted and installed alongside of mild steel, the high carbon frequently just meeting the requirements of the former milder steel. Class A steel now calls for a minimum tensile strength of 80,000 lb. per sq. in. with an elongation of 17 per cent. in 2 in., which is 2 per cent. higher than formerly. A special grade of steel for castings is stipulated, calling for a minimum tensile strength of 90,000 lb. per sq. in., with an elastic limit of 57,000 lb., an elongation in 2 in. of 20 per cent. and a reduction of area of 30 per cent. A feature of this grade of steel is a requirement of not over 0.04 per cent. in sulphur and in phosphorus. While the composition is not stipulated this is evidently intended to cover nickel steel.

While former requirements entirely ignored sulphur, the new specifications call for a percentage not exceeding 0.05. This is without doubt a hardship for some foundries. The stipulations for phosphorus remain at 0.06 per cent. as a maximum, except in the case of Class A steel in which it has been changed to 0.05 per cent. With each change in specifications the demands made on the manufacturer are becoming more stringent.

Reports from manufacturers of welding equipment show that vanadium steel of the following composition has been found to give unusually satisfactory results for oxy-acetylene welding purposes: Carbon, 0.10 per cent.; manganese, 0.24 per cent.; vanadium, 0.17 per cent.; phosphorus, 0.012 per cent.; sulphur, 0.028 per cent.; silicon, 0.214 per cent.

The Illinois Central has ordered 50 mikado type locomotives from the Baldwin Locomotive Works and the Missouri, Kansas & Texas of Texas, 25 mikado type freight locomotives from the American Locomotive Company.

IRON ORE BRIQUETTES

Effect of Large Percentage on Furnace Output and Coke Consumption

A test run at the Ilsederhütte near Hanover, Germany, gives more definite data than seem to have become available in this country as to the results from using a large percentage of iron ore briquettes in the blast furnace charge. Of the total ore charge in the German test 72 per cent. was briquettes. At the beginning of the trial the charge consisted of

15,500 kg.—34,100 lb. briquettes,
5,000 kg.—11,000 lb. lean limy ores,
7,600 kg.—16,720 lb. coke.

In view of the lumpy condition of the burden the blast pressure was reduced from the start. It was found necessary, however, to further reduce pressure and within two days after the starting of the test run it was one-half of the normal operating pressure. On the third day the tuyeres were replaced by smaller ones and the blast pressure increased.

The charge had to be slightly reduced temporarily during the first two days but gradually was increased to 22,000 kg. (48,400 lb.) consisting of:

16,000 kg.—35,200 lb. briquettes,
6,000 kg.—13,200 lb. lean, limy ores,
7,600 kg.—16,720 lb. coke.

The trial had to be stopped when the supply of briquettes was exhausted. The results obtained were:

1. A steady highly satisfactory operation.
2. A considerable decrease of blast pressure.
3. An increased output.
4. An increased yield.
5. A decreased consumption of coke per ton of pig iron produced.
6. A small production of flue dust.

The test run used up:

	Fe per cent.	CaO per cent.	SiO ₂ per cent.
2,639,840 tons of briquettes averaging.....	43.8	7.11	9.76
887,980 tons of lean limy ore averaging....	17.5	32.10	4.13
129,250 tons of limy ore averaging.....	31.1	18.50	5.00
1,302,560 tons of coke.			

and produced 1,406,530 tons of pig metal. From these amounts the yield is 38.46 per cent. and the coke consumption is 926 kg (2039 lb.) per metric ton pig iron.

This compares with the results obtained during the same month operating under normal conditions with 17 per cent. of briquettes on the burden with a yield of 33.48 per cent. and a coke consumption of 992 kg (2182 lb.), or 66 kg (145 lb.) more per metric ton of pig iron.

The Ilsederhütte claims a saving of 6.39 marks (\$1.52) per ton pig iron when using a large amount of briquetted ores including cost of briquetting, as compared with using the same ore in its natural state.

The main advantages claimed to be obtained by the use of briquettes are a more uniform operation of the furnace with fewer disturbances due to the use of fine ores; a considerable reduction of blast pressure and volume; and following this, an increased furnace output. The decreased blast pressure and reduced speed will result in a better heat and lower top gas temperatures, less flue dust, and considerably less loss of coke particles carried out with the dust, and a better grade of metal obtained on account of the steadier operation and the higher temperatures, especially by the use of large quantities of briquettes.

ESTABLISHED 1855

THE IRON AGE

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, Pres. and Treas. Charles G. Phillips, Vice-Pres. Fritz J. Frank, Secretary M. C. Robbins, Gen. Mgr.

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; to Canada, \$7.50 per year, to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

EDITORS

GEO. W. COPE

A. I. FINDLEY

W. W. MACON

CHARLES S. BAUR, Advertising Manager

The Decline in English Prices

We have become accustomed to the view that iron and steel prices fluctuate much more in the United States than abroad. While this view rests upon a sound basis historically, it is scarcely applicable to the recent past. As is well recognized, fluctuations in iron and steel prices in the American market have been covering a smaller range in the past few years than they formerly did.

A year ago prices in the United States were substantially at their high point after the continuous but moderate advance of 1912. Pig iron is now about \$3 a ton lower, while finished steel averages about 20 cents per 100 lb., or \$4 per net ton, lower. Comparing prices in the British market to-day with those of one year ago, the following declines in pig iron are found, per ton of 2240 lb.:

No. 3 Middlesbrough	12s. 9d. (\$3.10)
Cleveland warrants	12s. 10d. (\$3.12)
Scotch warrants	12s. 10½d. (\$3.13)
Hematite warrants	19s. 6d. (\$4.75)

Taking the average at 13s. we have \$3.16 per ton, a decline fully comparable with that which has occurred in the United States. In finished iron and steel we have the following declines, per ton of 2240 lb.:

Marked bars	£1 2s. 0d. (\$5.36)
Common bars	£1 17s. 6d. (\$8.88)
Rails	5s. 0d. (\$1.22)
Galvanized sheets	£1 0s. 0d. (\$4.87)
Steel angles, Middlesbrough.....	£1 15s. 0d. (\$8.52)
Steel angles, Glasgow	£2 0s. 0d. (\$9.73)
Steel plates, Middlesbrough.....	£1 15s. 0d. (\$8.52)
Steel plates, Glasgow.....	£2 0s. 0d. (\$9.73)

One may well disregard the small decline of 5s. (\$1.22) a ton in rails, seeing that there has been no decline at all in rails in the United States. The other declines range from £1 to £2 (\$4.87 to \$9.73), or from 22 to 44 cents per 100 lb., \$4.40 to \$8.80 per net ton. The average of all the items mentioned, except rails, is £1 12s. 9d. (\$7.97), equal to 35 cents per 100 lb., or \$7 per net ton.

These declines thus average nearly double the amount of those which have occurred in the United States. The former prices were probably fictitious in a measure, but in somewhat similar measure were the prices in the United States, seeing that many large contracts were being filled a year ago at prices much below the level then currently quoted as the market on fresh transactions.

Some surprise may be expressed that with such heavy declines in the English market there has not

been more tendency to bring the material into this country. The fact is that the British market was much above the Continental market, and is still well above it. Computations of the cost of importing foreign steel under our new tariff are usually based upon Belgian and German prices. Frequently such computations have shown that the material could be brought in, but similar computations would usually show that the material could more readily penetrate the British market, with no tariff, with lower cost of carriage and greater ease of doing business on account of contiguity. The fact seems to be that materials which carry the same general trade designation are not really comparable, coming respectively from Continental or British mills. American consumers may eventually be found as indisposed to buy such Continental material as has been shown to be the case with British consumers.

Setting Cleveland Clocks Ahead

Central standard time, after being used 28 years, will be discarded in Cleveland, Ohio, and on May 1 that city will go on Eastern time, which has been officially adopted by the City Council. The change was approved by the directors of the Cleveland Chamber of Commerce after an investigation by a special committee and also by the leading labor organization. The city government secured an expression of opinion by sending out postal cards to a large number of manufacturers and merchants, and nearly all the replies were in favor of the change. With central standard time, Cleveland clocks are now 33 minutes slower than sun time. Setting the clocks an hour forward will mean that the city will run 27 minutes ahead of sun time and will have the same time as all the Eastern cities.

The purpose of the change is to secure more daylight in the working hours of the day. Among the arguments urged in its favor were that going to work an hour earlier and quitting an hour earlier will prove a benefit to health, will afford more recreation and better conditions for sleep, provide more daylight for the return of working men and women to their homes, make work in industrial plants more efficient, result in a saving in the cost of artificial illumination—in short, will be a step toward ideal time conditions. The principal argument against the adoption of Eastern time was the inconvenience to the traveling public and the confusion resulting from two standards of time, since the

railroads will probably adhere to central time. The Chamber of Commerce committee in its report found that assuming the average hours of rising and retiring are 6 a. m. and 10 p. m., respectively, 201 hours more of daylight a year would be available by changing the clocks; also 201 more hours of darkness would be provided yearly for the sounder sleep of the earlier night instead of in morning hours when it is daylight most of the year. Among other facts brought out in the report are that with the change in time 234 additional daylight hours per year will be available after 5:30 p. m. for out-door recreation, and during 276 days there would be daylight after 5:30 p. m. As the earliest setting of the sun would occur at 4:55 o'clock, nearly all factories would close every day before sunset. Erie, Pa., and some other cities in the eastern part of the central standard time zone are using Eastern time. Cleveland, however, is the first of the cities near the center of that zone to make the change. It is expected that some of the smaller northern Ohio cities will follow Cleveland's lead in adopting Eastern time and efforts will be made at the next session of the Ohio Legislature to have Eastern time made the official time throughout the State.

Belated Government Statistics

The Department of Commerce is credited by Washington dispatches with having issued March 14 the preliminary statement of merchandise imports and exports in January. The time of its appearance should be noted. The lapse of a full month and a half after the close of the month for which the statistics are issued indicates a lack of effective work in the Department of Commerce which would not be tolerated in a thoroughly organized commercial establishment.

The statistics issued by the Department of Commerce are presumed to be of importance to business men. The secretary in charge is evidently of this opinion, as otherwise the press would not be favored by the department with statistical statements, analyses of imports and exports and other papulum intended to encourage the belief that this branch of the Government is working effectively in the education of business men. Commercial statistics, however, if they are to have any value should be fresh. They are certainly far from fresh when published so long after the passage of the period to which they refer.

The Department of Commerce is in a peculiar position. It has close relations with the business interests of the country, and its present head is in much demand by commercial organizations and gatherings of business men because of his ability to discuss live topics of the day and his readiness to make suggestions of a practical character. He is especially fond of dwelling on efficiency and inefficiency, being particularly severe on manufacturing establishments under the slightest suspicion of not being thoroughly modern in equipment and methods. In thus aiming his weapons at attractive game he has apparently overlooked something equally worthy of his attention much closer to him. He probably may not be aware that all business establishments, even those not classed in his opinion as the most efficient, use the telegraph and tele-

phone freely these days. The Department of Commerce, however, judging from the slowness of its operations, must evidently depend wholly upon the antiquated mail service, with a possible preference for stage coach delivery. Probably it might be well for some energetic member of Congress to introduce a bill to remove the shackles from the Department of Commerce, open it up to the influences of the new freedom and give it the opportunity to present its commercial statistics as fresh as possible.

Exclusive Territorial Rights Attacked

The machinery manufacturers and dealers of the country are a good deal disturbed over the provision embodied in the so-called "Five Brothers" bill now before Congress, which would abolish the generally adopted principle of exclusive territorial rights in the relations of the manufacturer and his agents. The section follows:

Section 10. That it shall be deemed an attempt to monopolize trade or commerce among the several States, or with foreign nations or a part thereof, for any person in interstate or foreign commerce to make a sale of goods, wares or merchandise or fix a price charged therefor or discount from or rebate upon such price, on the condition or understanding that the purchaser thereof shall not deal in the goods, wares or merchandise of a competitor or competitors of the sellers.

Most metal working machinery is sold through dealers. A comparatively few of the largest builders sell direct to the users and maintain their own forces of salesmen, their business being large enough to warrant the maintenance of a complete, independent organization, including in the case of some houses offices and storerooms in the important cities. But as a general thing it has been found a less expensive and as efficient a method to divide up the country into territories, each centering in a large city, giving to one dealer exclusive rights for his particular division. All sales must be through his office.

This system operates to the advantage not only of the builder and the dealer, but of the customer as well. The dealer acquires complete familiarity with the products he represents. His salesmen become experts in the machines they handle. The manufacturers give them full knowledge of everything new that is brought out, in mechanical practice or otherwise, as it applies to their machines. The co-operation between the factory and the office of the agent is close, and in many cases very highly developed. Salesmen visit the shops, and are given opportunity for observation and for definite instruction. In some cases young men, upon entering the employ of dealers, are sent to the factories whose products they will handle and are given a practical course, learning how to operate the machines to the best advantage. Some manufacturers maintain a corps of demonstrators or of specially trained engineers, or both, who work in close harmony with the dealers. Naturally the customer has in this way a great advantage. The dealers are always ready to look after his needs, each undertaking to investigate and correct any failure to secure the best results from the machinery he sells and to expedite repairs. As a connecting link between the builder and the user, the dealer is a factor of very great importance.

On the other hand, a chaotic condition would be created should the section quoted become a law. Every dealer might be presumed to furnish any machine on the market. It is held that he would have a right to sell anything that another dealer in his territory was permitted to handle. At present a dealer sells, for example, only one of five or six or more turret machines of a given class. He knows his own machine intimately. He understands just how to start his customer on the work, so that he will get the greatest possible efficiency. But the user in his territory must purchase the machine of him, if it is preferred to the others of the type. The change under the new order of things would be very marked. A buyer could go to another dealer and demand this particular machine, and the manufacturer would be compelled to furnish it. The dealers and their salesmen would be compelled to distribute their energies in the study of all types and of all makes of machinery which come within the scope of their lines. The tendency would be for each to become a jack of all trades, as it were, and a master of none. The customer might profit to a certain limited extent. He could shop around to better advantage, perhaps, especially when he had old machinery to trade in. But the gain would be trifling, when compared with what he receives under the present system.

The small manufacturer of machinery would be perhaps the greatest sufferer by the change. He could not afford to maintain a complete selling organization of his own. Some of his larger competitors might decide to change to this method of distributing product, following the system already established by a few of their fellows. A law aimed to strike the great corporation, as the one proposed is said to be, would in this instance help the large employer in proportion to the injury done to the smaller. But the large concerns do not want it. They feel they are better off operating on the stable basis upon which the trade is now established.

Opponents of section 10 maintain that it is an entirely unnecessary addition to the law as now contained in the Sherman act. The understanding is that it is aimed to meet conditions resulting from alleged abuses in particular trades. Whether or not this is a fact, to pass the bill in its present form would demoralize a branch of the metal industry concerning which no complaint of attempted monopoly has ever been made. The machinery business contains none of the elements which are commonly associated with a "trust." In every line it is sharply competitive—no industry more so. Those engaged in it rightly protest against being hit by ill-considered legislation over the shoulders of actual offenders against business ethics.

George Westinghouse

The death of George Westinghouse is not only a heavy loss to our own country but to the whole civilized world. By his invention of the air brake he became a benefactor of the human race, no other development in railroad practice having done so much to add to the comfort and safety of people in traveling as did his conception that air could be used to control the movement of trains. His untiring efforts to induce men of means to help him per-

fect and introduce his invention and his refusal to accept defeat showed his indomitable spirit. He met with obstacles at every turn, but finally triumphed. From a small shop located in Liberty street in Pittsburgh, the manufacturing business he started steadily grew, and the immense plants bearing his name, located in numerous cities of the United States and Europe, will serve to perpetuate the memory of one who when called by the grim reaper could feel that his life had not been in vain.

He was a man of most lovable character, and his impeccable honesty and scrupulously fair dealing endeared him to the thousands of his employees, who sincerely mourn his death. There are to-day men on the payrolls of the Westinghouse interests at Pittsburgh whose names were there more than 40 years ago, and Mr. Westinghouse had no warmer or truer friends than these. The interests of his employees were always close to his heart, and the recent pension system adopted by the Westinghouse Air Brake Company was largely his creation.

The ability of George Westinghouse was not confined to the inventive field alone. Following the financial panic of 1907, when the Westinghouse Electric & Mfg. Company and some of the other Westinghouse interests were compelled to ask the indulgence of creditors, Mr. Westinghouse did much to bring order out of chaos. Largely due to his untiring efforts, these concerns in which he took so much pride have been rehabilitated and are again in good financial condition. George Westinghouse is gone, but his memory will live in the years to come in his good deeds, in the substantial industries here and abroad that bear his name, and last but not least in the fact that he was a true man.

Correspondence

Size of Photographs for Retouching

To the Editor: It is a fact that many manufacturers do not know that in retouching photographs for making cuts there is such a thing as an economic size that should be turned over to the retoucher. In many cases this is unimportant, but it was forcibly brought to my attention not long ago that in many instances prices three times too high are being paid for retouching simply because the photograph is either too large or too small.

For example, I was recently handed a photograph of a pipe coupling with instructions to make good 3-in. cuts from it. First, it had to be retouched. The photograph was about 12 in. long over the greatest dimension and covered a large area. I thought it was first class and went directly to our retoucher with it. The retoucher smiled broadly when he quoted a price of \$15 and I was just on the point of accepting his price when he frankly came out and told me that it would be more economical for me to first have the photo reduced to about one-third size. He said that he could then retouch it for \$5, because it would only take about one-third as much time. A pipe coupling, you see, is a very simple piece of hardware with detail that is easily distinguishable and quickly done with an air brush. "However," the retoucher added, "if you are likely to make cuts larger than 3 in. you had better reduce it only one half."

I took the latter point up with the manufacturer and learned that 3 in. was as large as he cared to show the coupling in any of his advertisements or literature, and so I followed the retoucher's instructions and had the photograph reduced to one-third its original size. True to his word he retouched it for \$5.

Of course, the labor in having the photograph reduced and the cost of the second print made the saving less than \$10, but it was worth while nevertheless and I am now somewhat the wiser. I know that there is an economic size.

Machinery with much detail should always be photographed large if all the detail is to be brought out distinctly, and machinery with little detail much smaller, unless, as I have already said, extremely large cuts are to be made for advertising or catalog literature. The writer has had some experience with enlarged retouched photographs. The enlargements never look right because every little imperfection in retouching is magnified. Where the manufacturer doesn't know whether or not large cuts are to be made at some time or other, or whether enlargements are to be made, he is always safe in making the original photograph large.

N. G. NEAR.

Vocational Education at Public Expense

To the Editor:—The question who should direct vocational education seems to be still unanswered. It is not strange that the various boards of education are unappreciative of the necessity of having this phase of the school system under the control of trained men. Unfortunately most of the members of these boards are unfamiliar with any educational system. Yet they have the last say regarding the academic courses and naturally desire the same authority over the vocational courses.

Nevertheless the preparation of youths for trades should be part of the public school system, as no argument can be raised to the contrary which could not just as logically be used against preparation for college.

The taxpayer whose children stand no chance of higher education is contributing toward the education of something less than 5 per cent. of the graduates who go to college. The parents of these latter students should certainly contribute toward the vocational training of the other 95 per cent. With a board of education made up along the lines followed in Wisconsin, all phases of instruction, whether vocational or otherwise, would receive proper attention. The membership of the board referred to is made up of three educators, three employers and three employees. With vocational education a part of the public school system, the employer would be relieved of any unfair portion of the expense, his contribution being made by payment of taxes.

H. D. MURPHY.

JERSEY CITY, N. J., March 14, 1914.

Cancelling Industrial Railroad Allowances

WASHINGTON, D. C., March 17, 1914.—The statement is made at the offices of the Interstate Commerce Commission that the trunk lines in the territory east of the Mississippi River are filing cancellations of allowances to industrial railroads run in connection with iron and steel works, and that the cancellations will take place between April 1 and 15. The trunk lines will then begin to receive the whole of the rate in and out. No check has yet been made to ascertain whether all of the industrial lines have had their allowances eliminated, but all the tariffs are not in yet. After the cancellations go into effect, either shippers, trunk lines, or industrial lines can complain to the commission of remaining discrimination or of lines not following its direction that the allowances be eliminated or canceled.

W. L. C.

CONTENTS

A 10,000-Ton Hydraulic Forging Press.....	713
Machine for Boring Locomotive Cylinders.....	719
Large Morgan Crane Contract.....	719
New Multiple Drilling Machine.....	720
Study of Workmen's Compensation.....	721
Sloss-Sheffield Steel & Iron Company.....	721
A Split Safety Clutch for Shafting.....	722
American Steel Foundries.....	722
New Factory Tractor.....	723
The Fluorine Process in the Open-Hearth.....	724
Life of Cupola Linings.....	725
Recent Test of a Turbo Air Pump.....	725
Death of George Westinghouse.....	726
The Otto Coking Company, Inc.....	727
Bethlehem Steel Corporation.....	727
Cement Doors at Minnesota Steel Plant.....	728
A Factory Safety First Bulletin.....	728
A Feed Water Heater and Oil Separator.....	728
German Blast Furnace Plant.....	729
Small Steel Castings as a Specialty.....	730
The Heat Efficiency of the Open Hearth.....	732
The Decline in English Prices.....	734
Setting Cleveland Clocks Ahead.....	734
Belated Government Statistics.....	735
Exclusive Territorial Rights Attacked.....	735
George Westinghouse.....	736
Correspondence.....	736
Cancelling Industrial Railroad Allowances.....	737
A National Bureau of Labor Safety.....	737
The Iron and Metal Markets.....	738
The Use of Heavy Oil Fuel.....	748
The Insulation of Furnaces.....	749
Judicial Decisions.....	749
Heavier Loading of Cars.....	750
Pittsburgh and Valleys Business Notes.....	751
Adding Flue Dust to Molten Iron.....	751
Personal.....	752
Obituary.....	753
A Four-Cylinder Triple-Expansion Engine.....	754
January Iron and Steel Exports and Imports.....	754
Germany's Exports in January.....	754
Western Branch, National Metal Trades.....	755
Rhode Island Branch National Metal Trades.....	755
Waste Material Dealers' Association.....	755
Sheet Metal Contractors' Convention.....	755
Worcester Branch National Metal Trades.....	755
The Continental Supply Company.....	756
Otis Elevator Company.....	756
Corrosion of Alloy Steels.....	756
Russia's Shortage of Pig Iron.....	756
High-Speed Steel Scrap.....	756
The Machinery Markets.....	757
Trade Publications.....	766

A National Bureau of Labor Safety

WASHINGTON, D. C., March 18, 1914.—The House has passed the bill creating a Bureau of Labor Safety in the Department of Labor. The bill was sent to the Senate and referred to the Senate Committee on Labor. It will not be a very pretentious bureau, but will probably be the beginning of one which from year to year will secure larger appropriations and broaden its work. The bill as it passed provides for a commissioner of labor safety and other employees, and outlines the duties of the bureau as follows:

To make general and special investigation and examination of labor safety plans and devices of all kinds, and the need therefor, generally and specifically, and also the study of all phases of the subject of vocational diseases, and to make public the results of such investigation, examination, and study from time to time; also, to gather, compile, publish and supply useful information concerning the use of labor safety plans and devices and vocational diseases in the industries of the United States and elsewhere.

The bill also provides for the erection of a museum of sufficient size and capacity, in which will be exhibited approved devices for the safe-guarding of machinery, the protection of employees from injury, the lessening of dangerous conditions which may exist in any industrial enterprise, etc. The Senate will fix the initial appropriation, and an attempt will be made to make it a large one, but it is not believed the effort will meet with much success at the present time.

W. L. C.

The Iron and Metal Markets

PRICES SHOW WEAKNESS

New Business Is Less Satisfactory

Sales of Plates and Shapes, and Less Frequently of Bars, at 1.15 Cents—Pig Iron Weaker

The hopes of the steel trade have centered of late in the renewed activity which has always come with the advance of spring, but their realization is deferred. The railroad situation is charged with upsetting the calculations for 1914 that up to a month ago seemed better in iron and steel than in most other industries.

While the rate at which specifications are coming in promises the continuance of the present scale of mill operations for a few weeks, it is evident that early April must bring larger buying if curtailment is to be averted. There are also involved some contracts for second quarter delivery made at \$1 a ton higher than the basis of current shipments. Specifications will not come forward on these if other mills are then selling at lower prices, and the tendency is now admittedly that way.

In the absence of rail buying, the outlook for plate and structural tonnage is doubly important. Shading of prices appears in both these lines and particularly in Eastern territory mills have found it necessary to go to 1.15c., Pittsburgh, to meet prices called out by desirable business. Bars have shown relatively less weakness than plates and shapes, though some concessions have been made on contracts for concrete reinforcement. Not only plates but also bars and shapes are reported sold from Chicago district mill last week at prices equivalent to 1.15c., Pittsburgh. For shapes this quotation was exceptional, and for bars it was brought out by particularly desirable specifications, but for plates it is about the market.

Our Chicago advices are that plans for the extension of the notes of the M. Rumely Company and also of the Avery Company, together with the sale of \$12,000,000 of bonds of the Case Threshing Machine Company will materially improve, for the present, at least, the situation with the agricultural implement manufacturers.

Construction work is rather more plentiful. In the Eastern district a total of 14,000 tons was let on contracts averaging less than 600 tons, save for one building calling for 5000 tons. In Western territory 12,000 tons is reported let, including 4000 tons for the Lumber Exchange Building, Chicago, and 3450 tons for the First National Bank at Minneapolis.

Car buying for the week has been quite above the average—a total of 6225 placed, of which 3375 were for the Southern Railway, and 2000 for the St. Louis Southwestern. The New York Central is about to buy 3500 cars; the Central of Georgia, 500; the Illinois Central, 2000 to 2500; the Bessemer & Lake Erie, 1500, and the Duluth, Missabe & Northern, 1000.

The lighter products have been the saving features of the situation. Tin plate mills already have quite full operation guaranteed until nearly the end of the year. Sheet mills are busy, though there is some irregularity in prices. The wire trade is being helped by open weather. An advance in wire prices has been discussed as a further stimulant to

specifications on contracts taken on the 1.35c. and 1.40c. basis for fence wire.

It is evident that a good many foundries over-shot their pig iron needs in their December and January buying, as shipments are now being held up in an increasing number of cases. This condition militates against the stand furnacemen have lately taken in several districts for higher prices. New buying has fallen off and to that extent the market is weaker, though higher quotations are named by some furnaces in connection with inquiries for the second and third quarters. Foundries are not disposed to pay more for their iron and marking up prices may lead to a deadlock.

Steel-making pig iron drags and basic iron is weak at \$13 at Central Western Valley furnace. In eastern Pennsylvania a transaction of over 5000 tons is reported under special conditions, the price, about \$14.50 delivered, being above the recent level.

The reported sales of Lake iron ore from Gogebic range mines appear to be nothing more than the setting down of annual instalments on term contracts. There have been a few reservations of Bessemer ores, the basis to be fixed later, but no sales at stipulated prices.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous					
	Mar. 18,	Mar. 11,	Feb. 18,	Mar. 19,	
Pig Iron, Per Gross Ton:	1914.	1914.	1914.	1913.	
No. 2 X, Philadelphia...	\$15.00	\$15.00	\$15.00	\$17.75	
No. 2, Valley furnace...	13.25	13.25	13.25	16.50	
No. 2 Southern, Cin'ti...	14.00	14.00	13.75	16.25	
No. 2, Birmingham, Ala...	10.75	10.75	10.50	13.00	
No. 2, furnace, Chicago*	14.25	14.25	14.00	17.25	
Basic, del'd, eastern Pa...	14.00	14.00	14.25	17.50	
Basic, Valley furnace...	13.00	13.00	13.25	16.10	
Bessemer, Pittsburgh...	15.15	15.15	15.15	18.15	
Malleable Bess., Ch'go*	14.25	14.25	14.00	17.25	
Gray forge, Pittsburgh...	13.65	13.65	13.65	16.90	
L. S. charcoal, Chicago...	15.25	15.25	15.25	18.00	

Billets, etc., Per Gross Ton:

Bess. billets, Pittsburgh...	21.00	21.00	21.00	28.50
O.-h. billets, Pittsburgh...	21.00	21.00	21.00	29.00
O.-h. sheet bars, P'gh...	22.00	22.00	22.00	29.50
Forging billets, base, P'gh...	25.00	25.00	25.00	36.00
O.-h. billets, Phila.....	23.40	23.40	23.40	32.00
Wire rods, Pittsburgh...	26.50	26.50	26.50	30.00

Old Material, Per Gross Ton:

Iron rails, Chicago.....	12.75	12.75	13.25	16.25
Iron rails, Philadelphia...	16.50	16.50	16.50	18.00
Carwheels, Chicago.....	11.75	11.75	12.50	16.75
Carwheels, Philadelphia...	12.25	12.25	12.75	15.00
Heavy steel scrap, P'gh.	12.25	12.25	12.75	14.25
Heavy steel scrap, Phila...	11.25	11.50	11.00	13.50
Heavy steel scrap, Ch'go	9.75	9.75	10.50	12.25
No. 1 cast, Pittsburgh...	11.50	11.50	12.00	14.25
No. 1 cast, Philadelphia...	13.00	13.00	13.00	14.00
No. 1 cast, Ch'go (net ton)	10.25	10.50	10.75	12.50

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	1.25	1.25	1.27 1/2	1.67 1/2
Iron bars, Pittsburgh....	1.35	1.40	1.40	1.70
Iron bars, Chicago.....	1.15	1.15	1.12 1/2	1.57 1/2
Steel bars, Pittsburgh...	1.20	1.20	1.20	1.85
Steel bars, New York...	1.36	1.36	1.36	2.01
Tank plates, Pittsburgh...	1.15	1.20	1.20	1.70
Tank plates, New York...	1.31	1.36	1.36	1.76
Beams, etc., Pittsburgh...	1.20	1.20	1.20	1.70
Beams, etc., New York...	1.31	1.36	1.36	1.86
Skelp, grooved steel, P'gh	1.20	1.20	1.25	1.45
Skelp, sheared steel, P'gh	1.25	1.25	1.35	1.50
Steel hoops, Pittsburgh...	1.30	1.30	1.30	1.60

Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.95	1.95	1.95	2.35
Galv. sheets, No. 28, P'gh	2.95	2.95	2.95	3.50
Wire nails, Pittsburgh...	1.60	1.60	1.60	1.75
Cut nails, Pittsburgh...	1.65	1.65	1.60	1.70
Fence wire, base, P'gh...	1.40	1.40	1.40	1.55
Barb wire, galv., P'gh...	2.00	2.00	2.00	2.15

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

	Mar. 18.	Mar. 11.	Feb. 18.	Mar. 19.
Per Net Ton at Oven:	1914.	1914.	1914.	1913.
Furnace coke, prompt...	\$1.90	\$2.00	\$1.85	\$2.40
Furnace coke, future...	2.00	2.00	2.00	2.50
Foundry coke, prompt...	2.40	2.50	2.50	3.00
Foundry coke, future...	2.65	2.75	2.75	3.00

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	14.75	14.75	15.00	15.00
Electrolytic copper, N. Y.	14.25	14.25	14.62 1/2	14.87 1/2
Solder, St. Louis.....	5.15	5.15	5.25	6.15
Solder, New York.....	5.30	5.30	5.40	6.30
Lead, St. Louis.....	3.90	3.90	3.87 1/2	4.20
Lead, New York.....	4.00	4.00	4.00	4.35
Tin, New York.....	38.40	38.12 1/2	39.25	45.87 1/2
Antimony, Hallett's, N.Y.	6.75	6.90	7.00	8.50
Tin plate, 100-lb. box, P'gh	\$3.30	\$3.30	\$3.30	\$3.60

Chicago

CHICAGO, ILL., March 17, 1914.

By limiting his outlook to the immediate present one is able to eliminate the more unsatisfactory aspects of the situation, always excepting the unprofitable prices prevailing. Taken as a whole, specifications are just running ahead of shipments. Western mills of the Steel Corporation subsidiaries are averaging, in activity, about 70 per cent. of capacity. The leading independent interest is running its mills about full. Contracts on the books and in sight, if fully specified, are good for about the same gait through the second quarter. Without railroad buying, the prospect for the third quarter is admittedly flat. Orders are appearing from widely diversified sources, generally in small lots, and structural steel tonnage continues the backbone of current bookings. Contracts are reported closed in the West for 12,000 tons for buildings. In addition there are the 8000 tons for the 2000 cars ordered by the St. Louis & Southwestern and 12,000 tons of plates and shapes will be needed for steel ore cars for one of the Minnesota roads. Rail orders are of no consequence. For the principal steel products a price of 1.38c., Chicago, is the market, though one interest reports the sale of 3000 tons of shapes last week, for delivery in the second quarter on contract, at 1.43c. Pig-iron sales are made up of odds and ends, and requests for the delay of shipments are more numerous. There is no pressure on prices. Quotations for scrap have found still lower levels.

Pig Iron.—That the larger number of foundries have been disappointed in the volume and tonnage of business developing for them is apparent. The promise held out by the liberal buying of pig iron early in the year is largely offset by the extent to which tonnage is being held up now. A number of sales of carloads and lots up to 500 tons are reported, but the market is not a very keenly competitive one and prices are steady. Local makers are holding at \$14.25, f.o.b. furnace, for foundry and malleable. Reports are that the lowest prices on charcoal iron, recently obtaining, have been withdrawn, but it is even more certain that a number of charcoal stacks are quite anxious to increase their shipment tonnage. The Thomas furnace at Milwaukee is in after a long idleness, and the Iroquois Iron Company will continue two stacks in blast until the ore on the old furnace dock has been finished up, one furnace having been blown out on March 14. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal.....	\$15.25 to \$16.25
Northern coke foundry, No. 1.....	14.75 to 15.00
Northern coke foundry, No. 2.....	14.25 to 14.75
Northern coke foundry, No. 3.....	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	15.60 to 16.10
Southern coke, No. 2 f'dry and 2 soft	15.10 to 15.60
Southern coke, No. 3.....	14.60 to 15.10
Southern coke, No. 4.....	14.10 to 14.60
Southern gray forge.....	13.85 to 14.35
Southern mottled.....	13.35 to 13.85
Malleable Bessemer.....	14.25 to 14.50
Standard Bessemer.....	17.00
Basic.....	13.75 to 14.25
Jackson Co. and Kentucky silvery, 6 per cent.	16.90
Jackson Co. and Kentucky silvery, 8 per cent.	17.90
Jackson Co. and Kentucky silvery, 10 per cent.	18.90

Rails and Track Supplies.—No rail tonnages of importance are reported. The requirements of the Pennsylvania Lines are attracting some attention because of a further rigidity in specifications. Girder rails have

been specified with more liberality. Figures are being taken on a limited tonnage of tie plates. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, \$26 to \$28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Of a total of about 12,000 tons of building steel placed under contract last week the more important awards were 4000 tons for the Lumber Exchange Building, Chicago, and 3445 tons for the First National Bank building at Minneapolis. The former went to the American Bridge Company and the latter to the Minneapolis Steel & Machinery Company. Other contracts included 949 tons for the Crane Company plant, Chicago, let to the South Halsted Street Iron Works; 608 tons for the United States National Bank Building, Omaha, let to Paxton, Vierling & Co., of that city; 744 tons for a bridge at Green Bay, Wis., let to the Worden-Allen Company; 525 tons for bridges at Cameron, Tex., let to Austin Brothers; 436 tons by the Missouri Pacific for a viaduct at Omaha; 200 tons for the Hooper office building at San Francisco, let to the Pacific Rolling Mill Company, and 449 tons for a retaining wall for the Morrison Hotel, Chicago, let to the American Bridge Company. At Chicago, a new Heyworth building will shortly be up for figures, from 3000 to 5000 tons of steel being required, while another building project involving 4000 tons is reported. The American Car & Foundry Company took the order for 2000 cars for the St. Louis Southwestern, in which there will be about 8000 tons of steel for underframes. The same company is also reported as taking 1600 cars for the Southern Railway, the Mt. Vernon Car Company securing 500. The Duluth, Missabe & Northern, one of the Steel Corporation subsidiaries, will buy 1000 steel ore cars for which about 12,000 tons of steel will be placed. The demand for plain shapes is healthy and among the orders of the week from bridge shops are noted lots of 450, 600 and 3000 tons. For new business higher than 1.20c. can hardly be secured. For mill shipment, Chicago delivery, we quote for plain shapes 1.38c. to 1.43c.

From store, we quote for Chicago delivery of structural shapes, 1.75c.

Plates.—Tonnage in sheared plates is much desired by most of the mills. Even the users of tank plate are taking out material in much below normal volume. The orders of the Illinois Central for 50 locomotives placed with the Baldwin Locomotive Works and 22 placed with the American Locomotive Company, together with 25 also ordered from the latter company by the Missouri, Kansas & Texas, are important. Plates are nominally at 1.20c., Pittsburgh, but no confidence is had that this quotation could be sustained for desirable business. For Chicago delivery, from mill, we quote 1.33c. to 1.38c.

From jobbers' stock we quote for Chicago delivery of plates 1.75c.

Sheets.—The principal makers of sheets are sufficiently fortified in their bookings for the first half to refrain from general participation in the concessions now being quoted for sheets. For shipment from points in Ohio, 1.95c., Pittsburgh, is the prevalent quotation for No. 28 black sheets. Galvanized sheets are offered at a corresponding price. The largest independent producer finds its rolling schedules running through the greater part of April. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.63c.; No. 28 black, 2.13c. to 2.18c.; No. 28 galvanized, 3.13c. to 3.18c.

For sheets out of store we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—The standard steel bar business presents few new features from week to week. In reinforcing bars activity shows a rapid and steady increase. One Western mill reports its capacity sold up for the greater part of the second quarter. The Dubuque

Hotel, Dubuque, Iowa, figured for 410 tons of structural steel, will be built of reinforced concrete. Bar-iron tonnage is about holding its own in volume, and trade sentiment is in the direction of higher rather than lower prices. Quotations for steel bars are uniformly on the 1.20c., Pittsburgh, basis. We quote for mill shipments as follows: Bar iron, 1.15c. to 1.17½c.; soft steel bars, 1.38c.; hard steel bars, 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Hoops and Bands.—The new business offering in hoops and bands is of an incidental and miscellaneous character. Such concessions as are reported appear to have been elicited more by the desirability of specifications from the standpoint of sizes than tonnage. We quote for bands, 1.20c., Pittsburgh, with full standard classification extras, and for hoops, 1.30c., Pittsburgh base.

Rivets and Bolts.—With its notably increased capacity for the manufacture of rivets, the Western district scarcely reflects the increased demand which has come with the greater activity among fabricators. Prices, at least, have shown no response. Bolt mills are running light. We quote from mill as follows: Carriage bolts up to $\frac{3}{8}$ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to $\frac{3}{8}$ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, \$6.20 off per cwt.; hexagon, \$7 off per cwt. Structural rivets, $\frac{1}{2}$ to $1\frac{1}{4}$ in., 1.78c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.40c.; boiler rivets, 2.60c.; machine bolts up to $\frac{3}{8}$ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to $\frac{3}{8}$ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, \$6.00, and hexagon, \$6.70 off per cwt.

Old Material.—The scrap market is entirely lacking in features of interest beyond the general fact that consumers are still naming the level of prices. Melters are buying to cover only their current consumption and seem quite able to delay their purchases from week to week until such time as the dealers find themselves willing to sell at a concession from the basis of the preceding sale. We have revised our quotations in keeping with this decline. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

<i>Per Gross Ton</i>	
Old iron rails	\$12.75 to \$13.25
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.75 to 12.25
Heavy melting steel scrap	9.75 to 10.00
Frogs, switches and guards, cut apart	9.75 to 10.00
Shoveling steel	9.00 to 9.25
Steel axle turnings	6.75 to 7.25

<i>Per Net Ton</i>	
Iron angles and splice bars	\$12.25 to \$12.75
Iron arch bars and transoms	12.25 to 12.75
Steel angle bars	9.00 to 9.50
Iron car axles	17.50 to 18.00
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.25 to 8.75
Cut forge	8.25 to 8.75
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.75 to 10.25
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	5.00 to 5.50
Cast borings	4.75 to 5.25
No. 1 busheling	7.50 to 8.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	10.25 to 10.75
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	9.50 to 10.00
Railroad malleable	9.75 to 10.00
Agricultural malleable	8.50 to 9.00
Pipes and flues	7.00 to 7.50

Wire Products.—March and April are regularly heavy months for the shipment of wire nails, barb wire and fencing, and the present spring is following precedent. It is stated that specifications in the hands of the mills practically absorb the available stocks. Jobbers are understood to be ordering material in excess of contracts on the 1.55c. basis at the advance of \$1.

We quote to jobbers as follows: Plain wire No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78; galvanized, \$2.18; polished staples, \$1.78; galvanized, \$2.13, all Chicago.

Cast-Iron Pipe.—The only letting of pipe of importance during the week was the award of 600 tons at Council Bluffs, Iowa, to the American Cast Iron Pipe Company. The opening of bids on 3700 tons at Estevan, Alta., Can., showed the Canada Iron Corporation, of Edmonton, as low bidder. It is understood, however, that the purchase of pipe has not been financed as yet. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$26; 6 to 12 in., \$24; 16 in. and up, \$23.50, with \$1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., March 17, 1914.

The predominant feature of the market is that new business lacks snap. While prices are fairly well held, there unquestionably is a trend toward softness, due to the fact that demand, and especially that for forward delivery, has not been maintained. Pig iron has been uniformly quiet at sustained prices. In finished and semi-finished materials the tendency of not specifying much beyond present needs continues and under present conditions hope for better prices seems likely to be disappointed. Some good sales of furnace coke have been made. The old material market is a waiting one, though at least one good sale is closed or about to be.

Iron Ore.—New business of importance is still absent. In the week ended March 14 importations were confined to 11,350 tons of Cuban ore.

Pig Iron.—Business has not freshened to any appreciable extent, current sales and inquiries being almost exclusively confined to small lots of foundry grades, with moderate buying by cast-iron pipe makers. Business of this nature has been fair. The level of prices is practically unchanged. In view of the heavy movement at low prices of a few weeks ago, sellers realize that small concessions will not induce any great amount of business and they are inclined to average their sales so far as possible by getting the best price they can for filling such requirements as now come before them. Standard brands of No. 2 X Eastern Pennsylvania foundry range from \$15 to \$15.25, delivered, for early shipment, with some makers asking up to \$15.50, delivered, for next quarter. There still are No. 2 X brands quoted slightly under \$15. It is reported that an inquiry is out for probably 5000 tons of gray forge. Prices for this grade range from \$14 to \$14.25. Among the sales of the week was 300 tons of Virginia No. 2 X at \$13, furnace, and 500 tons of special Virginia iron at \$13.50, furnace. Some makers are sold up on basic, while inquiry is lacking. Actual sales of Southern iron are reported at \$11.25, Birmingham, for No. 2 prompt and \$11.50 for forward delivery. No. 3 Southern is said to have been taken at \$10.75, Birmingham. Basic is quiet at about \$14 to \$14.25, delivered, and standard low phosphorus at \$21 to \$21.25. A few carloads of the latter have been sold. Virginia irons are steady at about \$12.75, furnace, for No. 2 X, equal to \$15.55 to \$15.75, delivered, in accordance with variance in freight rates (rail and water and all rail). The current new business is in small lots, but deliveries are good and stocks are not increasing. The following range of prices about represents the market for near future delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	\$15.00 to \$15.25
Eastern Penna. No. 2 plain	14.75 to 15.00
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.00 to 14.25
Basic	14.00 to 14.25
Standard low phosphorus	21.00 to 21.25

Ferroalloys.—No changes are noted, the price for German 80 per cent. ferromanganese standing at \$38, seaboard, with English at \$39, seaboard. Inquiry is for small lots only. Ferrosilicon, 50 per cent., remains at \$71 to \$73, according to quantity, with the 11 per cent. grade at \$24.30, delivered.

Billets.—Specifications against contracts are proceeding at a fairly good rate, but new business is lagging. Quotations are unchanged, at \$23.40 to \$24.40,

delivered, according to quantity. Dependent on specifications, forging steel runs \$4 to \$5 a ton over rolling billets.

Plates.—Some mills are running fairly well but specifying is close and operations are unsatisfactory because of the consequent uncertainty. In a few cases second quarter contracts have been entered, but some makers add to their booking almost day to day. The daily demand serves to keep up the percentage of operation. Some bridge work involving plates on which bids have been submitted is encouraging, as is railroad locomotive buying, recently reported. Current business is still being taken at 1.35c., delivered for carloads, 1.38c. for part carloads, and forward at 1.40c., with no evidence that the hoped for hardening of prices is at hand.

Structural Material.—Local business is slow. The big propositions which recently held attention because of their bearing on this market are out of the way as new business. These include the Memphis bridge cantilever span which went to the Pennsylvania Steel Company, and the Widener Building in Philadelphia, which went to the American Bridge Company, as was previously indicated. In connection with the latter contract, rumors that the work was undertaken at an exceptionally low price have been emphatically denied. The Virginian Railway had an inquiry out for steel for 475 underframes, which it contemplated fabricating under its own immediate direction, but it is now understood that a car builder will get the contract, the work having been eagerly sought. Small propositions, such as requirements for public schools in inland towns, are being deferred in a disappointing way. Plain shapes are quoted at 1.35c., delivered.

Bars.—The recent bad weather had a more serious effect on this product than on most others and recovery is not yet complete. Bars can be had at 1.25c. to 1.27½c., delivered here. Steel bars range from 1.35c. to 1.40c., delivered. Complaint is heard of the irregularity of the demand.

Sheets.—In the matter of new business sheets are running much the same as plates, with a fair demand on contracts already entered. The current price is 1.55c. here for No. 10 blue annealed sheets, but makers would be unwilling to contract at that price, looking for 1.60c. Some of their present output on old contracts is at the lower figures of the recent heavy demand which was not maintained.

Old Material.—The market shows a tendency to await developments and at least a sentimental weakness. A prominent consumer is reported to have an inquiry out for No. 1 heavy melting steel in 3000-ton lots, while it is also reported that a deal for 10,000 to 15,000 tons was closed at around \$11.30, delivered. Another consumer says he has bought at less than published figures. It is certain that buyers and sellers have in some instances pulled apart rather than got together. Sales of No. 1 railroad wrought are reported at \$14.50; No. 1 forge fire at \$9.50 and \$10, and cast borings at \$9.25. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel.....	\$11.25 to \$11.75
Old steel rails, rerolling.....	13.00 to 13.50
Low phosphorus heavy melting steel scrap (nominal)	14.50 to 15.00
Old steel axles (nominal)	16.00 to 16.50
Old iron axles.....	22.00 to 23.00
Old iron rails.....	16.50 to 17.00
Old carwheels.....	12.25 to 12.75
No. 1 railroad wrought.....	14.00 to 14.50
Wrought-iron pipe	10.50 to 11.00
No. 1 forge fire.....	9.50 to 10.00
Bundled sheets	9.50 to 10.00
No. 2 light iron (nominal)	5.00
No. 2 busheling.....	8.00 to 8.50
Wrought turnings	8.50 to 8.75
Cast borings	9.00 to 9.25
Machinery cast.....	13.00 to 13.50
Grate bars, railroad.....	9.50 to 10.00
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	9.50 to 10.00

Coke.—The blowing in of an Eastern furnace and the requirements of a large Eastern interest have helped along the current demand. Prices quoted are \$1.90 to \$2 per net ton at oven for prompt shipment Connellsville furnace coke and \$2.50 to \$2.75 at oven for foundry coke. Freight rates from the producing districts are as follows: Connellsville, \$2.05; Mountain, \$1.65, and Latrobe, \$1.85.

Cleveland

CLEVELAND, OHIO, March 17, 1914.

Iron Ore.—Some reservations of Bessemer ore are being made, but no sales at fixed prices are reported. Ore firms appear to be getting in close touch with conditions among furnace men, and the buying movement may start in at any time. However, sellers express the opinion that buying probably will not start before April. There has been no crystallization of sentiment regarding prices. Dock shipment shows some improvement. We quote 1913 prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.50; Mesaba non-Bessemer, \$3.40.

Pig Iron.—The market continues very dull. The only sales reported in this territory are a few small lots of foundry grades. No round lot inquiries have come out either for foundry or steel-making iron. One interest reports foundry iron sales outside this immediate territory during the week aggregating about 4000 tons. Some of this iron was sold for last half delivery at an advance of 50c. a ton over current prices. In spite of the inactivity the market is firm, and Cleveland furnaces are reported to be adhering to \$14 at furnace for No. 2. A Wheeling sanitary interest is in the market for 500 tons of Northern foundry iron. The sale of a small amount of Southern iron is reported at \$11, Birmingham, for No. 2. We quote, f.o.b. Cleveland, as follows:

Bessemer	\$15.15
Basic	14.00
Northern No. 2 foundry	14.25
Southern No. 2 foundry	\$15.10 to 15.35
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55

Coke.—With very little buying quotations on foundry grades are unchanged at \$2.40 to \$2.75 per net ton at oven, but more coke is being offered at lower prices than recently. Furnace coke is generally quoted at \$2, but some grades are being sold at \$1.75 to \$1.90.

Finished Iron and Steel.—Some of the mill agencies report a slight improvement in inquiries. Considering the limited demand prices are being well maintained. Some recent cutting of prices on round lots of steel bars for reinforcing work are reported, but usually 1.20c. is the price on steel bars, plates and structural material, although desirable orders might bring out slightly lower prices. Recent demand from the implement trade has been extremely light, this being attributed to the fact that many makers of agricultural implements decided to go slow until their old finished stocks were disposed of and others have been using low priced steel bought prior to last July. The demand from this trade, however, has begun to show some improvement. New demand for structural material is light. The Kresge & O'Neil building in Akron, requiring 500 tons, was placed with the Burger Iron Company, Akron. The demand for bar iron continues very dull. We quote iron bars at 1.20c., Cleveland, for outside shipment and 1.30c. for local delivery. Sheets are quiet with prices unchanged at 1.90c. for No. 28 black and 2.90c. for No. 28 galvanized for early delivery. We quote stock prices at 1.80c. for steel bars, 1.75c. for iron bars and 1.90c. for plates and structural material.

Bolts and Rivets.—Bolt makers report a fair volume of business. Quite a few second quarter contracts are being closed. Makers appear to be holding prices, but there is some price cutting by jobbers. There is practically no new demand for rivets, but specifications are good. Prices are unchanged at 1.65c. for structural and 1.75c. for boiler in round lots. We quote discounts as follows: Common carriage bolts, $\frac{3}{8}$ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, $\frac{3}{8}$ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, \$6.30 off; hexagon h.p. nuts, blank or tapped, \$7.20 off; c. p. c. and t. square nuts, blank or tapped, \$6 off; hexagon, $\frac{3}{8}$ in. and larger, \$7.20 off; 9/16-in. and smaller, \$7.80 off; semi-finished hexagon nuts, $\frac{3}{8}$ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—As during the previous week practically the only trading done is between dealers, and the volume of this business has fallen off. Mills are well supplied and some are holding back shipments. The market is weak and reductions are made on several quotations. We quote, f.o.b. Cleveland, as follows:

<i>Per Gross Ton</i>	
Old steel rails, rerolling.....	\$12.00 to \$12.50
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.50 to 11.00
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.75 to 11.00
Light bundled sheet scrap.....	7.00 to 7.50

<i>Per Net Ton</i>	
Iron car axles	\$19.00 to \$20.00
Cast borings	6.50 to 6.75
Iron and steel turnings and drillings	5.50 to 6.00
Steel axle turnings	7.00 to 7.50
No. 1 busheling, new	9.00 to 9.50
No. 1 busheling, old	8.25 to 8.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	10.75 to 11.00
Stove plate	8.75 to 9.00

Cincinnati

CINCINNATI, OHIO, March 18, 1914.—(By Wire.)

Pig Iron.—The action of the Ironton district furnaces in advancing prices has apparently served to retard contracting. With the exception of a few small orders for immediate shipment, the order books of different houses are almost a blank. Some Southern iron has been sold, but there have been no sales of enough importance to report. Buyers are indifferent as to covering for future requirements, and the producers are also content to mark time until there is a change. The general opinion is that there will be no active business until after a buying movement is inaugurated for last half needs, and consumers state they will have to be offered better price inducements before they will enter the market. From a furnace cost standpoint this appears to be impossible, and the deadlock between the producing and consuming interests is apt to continue for some time. Southern iron can be obtained at \$10.75, Birmingham basis, for first half shipment although the general quotation is 25c. higher. Some warrant iron can be purchased at \$10.50 for prompt shipment but the quantity is said to be limited. Northern prices remain based on \$13.50, Ironton, with an advance of 50c. asked for last half delivery, but not enough business has come out to test the market. The only open inquiries include 1200 tons of Northern foundry iron from a West Virginia melter and 400 tons of either Northern or Southern Iron from southern Illinois, both for shipment over the next six months. There are several small lots of iron under negotiation in Indiana. It is reported that the Jackson County silvery furnace operators have adjusted their labor differences and the furnaces are now in full blast. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$14.50 to \$15.00
Southern coke, No. 2 f'dry and 2 soft.....	14.00 to 14.50
Southern coke, No. 3 foundry.....	13.50 to 14.00
Southern, No. 4 foundry.....	13.00 to 13.50
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon.....	17.20 to 17.70
Southern Ohio coke, No. 1.....	15.70 to 16.20
Southern Ohio coke, No. 2.....	14.70 to 15.20
Southern Ohio coke, No. 3.....	14.45 to 14.70
Southern Ohio malleable Bessemer.....	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel.....	27.25 to 27.75

(By Mail)

Coke.—Very little contracting is reported for either furnace or foundry coke. Most consumers are apparently well fixed for first half needs, and the few that are adopting a hand-to-mouth policy cannot be persuaded into making time contracts. The Ironton furnaces are fairly well supplied for the third quarter, while several have covered requirements for the year. This situation is somewhat different with the foundry trade; the jobbing foundries are not consuming the usual amount of coke, and as a consequence there have been numerous requests to delay shipments. Although Connellsville 48-hr. coke can be bought as low as \$1.90

at oven, the regular contract price of \$2 is asked by leading producers, and rules in both the Wise County and Pocahontas districts. Foundry coke is quoted at \$2.50 to \$2.75 per net ton at oven in all three districts.

Finished Material.—Specifications on contracts for practically all kinds of finished material have been slow. This is attributed to the checking of activities by the cold weather. The present week, however, opens up auspiciously, especially for the sheet mills, with which normal conditions practically prevail. The outlook in the building trades is much brighter, and a busy spring and summer season is anticipated. Architects have considerable work in sight, some of which is already under way, and this will naturally bring out a better demand for all kinds of construction materials. Our quotation on No. 28 black sheets remains at 2.15c. and on galvanized 3.15c., f.o.b. cars Cincinnati, or Newport, Ky. Steel bars from warehouse stocks are sold around 1.75c. and small structural shapes at 1.85c.

Old Material.—Hardly enough buying is being done to test the market on any grade of scrap. Prices continue weak, and the few transactions made are based on individual agreements between buyers and sellers. No particular class of scrap iron is in demand, with the possible exception of No. 1 cast. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

<i>Per Gross Ton</i>	
Bundled sheet scrap	\$7.25 to \$7.75
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up	20.25 to 20.75
Rerolling steel rails	11.25 to 11.75
Melting steel rails	9.75 to 10.25
Old carwheels	10.75 to 11.25

<i>Per Net Ton</i>	
No. 1 railroad wrought	\$9.25 to \$9.75
Cast borings	5.00 to 5.50
Steel turnings	5.00 to 5.75
No. 1 cast scrap	9.75 to 10.25
Burnt scrap	6.50 to 7.25
Old iron axles	17.25 to 17.75
Locomotive tires (smooth inside)	10.25 to 10.75
Pipes and flues	6.75 to 7.25
Malleable and steel scrap	7.75 to 8.25
Railroad tank and sheet scrap	5.75 to 6.25

Birmingham

BIRMINGHAM, ALA., March 16, 1914.

Pig Iron.—The pig-iron market in the South has shown a falling off in inquiry and the trade is marked by a distinct lethargy. Manufacturers charge much of the let-up to the status at foundries manufacturing miscellaneous castings. There is very little business on hand with them. This applies to a number of the largest foundries and machine shops in the Birmingham district and elsewhere. There was one sale of 10,000 tons to a pipe manufacturer. All Southern melters are able to secure iron at \$11 and it is still certain that quantities could be had at \$10.75. The railroads, sawmills and coal mines are smaller users of manufactured iron and steel products than is usual and this condition reflects itself all around. Only one pig-iron dealer reports any business of consequence and that was confined to one customer. The makers of special irons enjoy a good trade and are well sold. For that matter, all makers are quite well provided with orders well up to the middle of the year. For the third quarter very little has been done. Some sales have been made at \$11.25 and a few at \$11 on lap-over orders. In strictly competitive territory it is understood that large orders could be placed at less than \$10.75. We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$11.25 to \$11.50
No. 2 foundry and soft	10.75 to 11.00
No. 3 foundry	10.25 to 10.50
No. 4 foundry	10.00 to 10.25
Gray forge	9.75 to 10.00
Basic	10.50 to 11.00
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Makers of soil pipe are operating at capacity and in some instances are calling for additional labor. Sales are good and prices more satisfactory than in some time. Water and gas pipe manufacturers have received fill-in orders sufficient to prevent

the accumulations of stock. Prices are not maintained with regularity. We quote per net ton, f.o.b. makers' yards, as follows: 4 in., \$22; 6 in. and upwards, \$20, with \$1 added for gas pipe.

Coal and Coke.—The coke market has improved to a considerable extent and prices are more stable. We quote per net ton, f.o.b. ovens, as follows: Furnace coke, \$2.50 to \$2.75; foundry coke, \$3.25 to \$3.65. A number of small coal mines have closed down owing to the poor demand for domestic coal. Prices, however, continue to hold their own. The official report on the coal output of Alabama in 1913 shows a total of 17,883,495 tons, an increase over 1912 of 1,371,000 tons, both years being successive record breakers. The largest amount mined in any one county was 9,012,000 tons in Jefferson, the Birmingham district. The value of the output based on \$1.65 per ton is \$24,153,380.

Old Material.—It has been a quiet week. Light cast scrap has been in good demand with a number of sales made, but other lines have been dull. We continue to quote per gross ton, f.o.b. dealer's yards, as follows:

Old iron axles	.....	\$14.50 to \$15.00
Old steel axles	.....	14.50 to 15.00
Old iron rails	.....	13.00 to 13.50
No. 1 railroad wrought	.....	10.00 to 11.00
No. 2 railroad wrought	.....	8.50 to 9.00
No. 1 country wrought	.....	9.00 to 10.00
No. 2 country wrought	.....	8.00 to 9.00
No. 1 machinery cast	.....	9.50 to 10.00
No. 1 steel scrap	.....	8.00 to 8.50
Tram carwheels	.....	9.50 to 10.00
Standard carwheels	.....	10.50 to 11.00
Stove plate	.....	8.00 to 8.50

St. Louis

ST. LOUIS, Mo., March 16, 1914.

Pig Iron.—There has been a rather steady flow of small purchases for immediate shipment which have served to indicate pretty strongly that melting is going on in a satisfactory manner. There are some reports of suspension of shipment, but counterbalancing these are a considerable number of requests for anticipation of allotments. The bulk of consumers are taking their iron as contracted for. Quotations continue rather irregular, No. 2 Southern foundry, Birmingham basis, ranging from \$10.50 to \$11.50. No quotations are being made for last half and there are practically no inquiries for that delivery.

Coke.—Demand has been for small lots for immediate needs. Specifications continue steady.

Old Material.—There is very little business and quotations are really nominal. The lists out include one of 2500 tons from the Missouri, Kansas & Texas and one of about 500 tons from the Frisco, low prices being made on both. Relaying rails are weaker than they have been and prices are a little off, with slackened demand. We quote dealers' prices, f.o.b. St. Louis as follows:

<i>Per Gross Ton</i>		
Old iron rails	.....	\$11.50 to \$12.00
Old steel rails, re-rolling	.....	11.75 to 12.25
Old steel rails, less than 3 feet	.....	10.50 to 11.00
Relaying rails, standard section, subject to inspection	.....	22.00 to 24.00
Old carwheels	.....	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	.....	10.50 to 11.00
Shoveling steel	.....	9.00 to 9.50
Frogs, switches and guards cut apart	.....	10.50 to 11.00
Bundled sheet scrap	.....	4.50 to 5.00

<i>Per Net Ton</i>		
Iron angle bars	.....	\$11.00 to \$11.50
Steel angle bars	.....	9.25 to 9.75
Iron car axles	.....	17.50 to 18.00
Steel car axles	.....	12.50 to 13.00
Wrought arch bars and transoms	.....	12.00 to 12.50
No. 1 railroad wrought	.....	9.00 to 9.50
No. 2 railroad wrought	.....	9.00 to 9.50
Railroad springs	.....	9.25 to 9.75
Steel couplers and knuckles	.....	9.00 to 9.50
Locomotive tires, 42 in. and over, smooth	.....	10.50 to 11.00
No. 1 dealers' forge	.....	8.00 to 8.50
Mixed borings	.....	4.00 to 4.50
No. 1 busheling	.....	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	.....	6.25 to 6.75
No. 1 cast scrap	.....	10.00 to 10.50
Stove plate and light cast scrap	.....	8.50 to 9.00
Railroad malleable	.....	8.25 to 8.75
Agricultural malleable	.....	7.75 to 8.25
Pipes and flues	.....	6.25 to 6.75
Railroad sheet and tank scrap	.....	6.50 to 7.00
Railroad grate bars	.....	7.50 to 8.00
Machine shop turnings	.....	5.00 to 5.50

Finished Iron and Steel.—Orders are keeping up in a fairly satisfactory manner. Bars are in good demand. The agricultural implement houses are working off their stocks in a satisfactory manner and are reported as likely to re-enter the market. In standard section steel rails a sale of 5000 tons to the Terminal Association is practically closed and a Kansas interurban line is a likely prospect for about 22 miles of standard rails.

San Francisco

SAN FRANCISCO, CAL., March 10, 1914.

The spring activity which normally begins about this time may be delayed several weeks as a result of the excessive rains, outside work being still greatly retarded. Inquiries in some lines are increasing, but buyers show a tantalizing reluctance to place their orders, apparently due to delay in financing new projects. It is unlikely that there will be any heavy contracting or accumulation of stocks beyond nearby requirements until after the opening of the Panama Canal, as the consequent freight changes are expected to have a marked effect on local values, and may enable Eastern mills to meet foreign competition more effectively than they have as yet. The outlook for actual requirements is favorable, with crops in excellent shape, and a great deal of construction work, held up last year, to be carried out.

Bars.—Most large buyers are now so well supplied with foreign material that little business is coming out in soft steel bars, and the increasing requirements of some large consumers accordingly have no effect on the market. Jobbing orders are a little better, but there is no real activity. With domestic bars offered for sea shipment at about 1.65c., San Francisco, and a possibility of lower figures on the opening of the Panama Canal, there is little inducement to place further business with importers. So far the tonnage of reinforcing material has not been large, and all important inquiries bring out keen competition. Neither of the local mills is running now.

Structural Material.—A very fair tonnage has been booked during the last fortnight and, with current business well distributed and a considerable number of small jobs in sight, fabricators hope to get somewhat better prices. The Pacific Rolling Mill Company has taken contracts for the Greenwich apartments, 300 tons, and the Hooper apartments, about 200 tons. The Western Iron Works has the Hyman building, 275 tons. The Central Iron Works has taken the Labor Temple job, amounting to about 300 tons, and the six-story Gartland building. It is reported that some important business will be closed shortly at Los Angeles. Plans have been adopted for the Fireman's Fund building, but figures have not yet been called for, and nothing has been heard of the more important work in prospect locally. A small job for the Coit Investment Company, Oakland, is being figured. Some steel will be required for the new Union Iron Works drydock, but the requirements are not yet known. An inquiry is expected for a 3200-ft. bridge, with a 200-ft. lift span, at Rio Vista as soon as the approval of the War Department can be secured. It is reported that the Meier & Frank Company, Portland, Ore., will build a 12-story Class A building, with a two-story addition to the old building.

Rails.—A few good orders have been placed recently, and small inquiries, principally for light rails, have been quite numerous. Such inquiries, however, have resulted in little actual business. Merchants have ordered some foreign light rails, but American light rails can now be laid down here at about 1.55c., and there is no inducement to buy foreign material. Several good-sized propositions are coming up, but are awaiting financial developments. Relayers are becoming scarce.

Plates.—The jobbing trade remains rather quiet, and merchants, though looking for a better demand at any time, are buying little beyond current needs. Specifications are coming out quite well from tank and pipe manufacturers, with prospects of an increasing tonnage, though no new contracts of importance are reported.

Sheets.—While the market appears firm, and there is some talk of higher prices, little improvement is observed either as to specifications or new business. The consuming demand so far has been light, but a rapid improvement is expected within the next month.

Standard Pipe.—Merchants continue to buy sparingly, and while there is more movement in the city plumbing supply trade the ground is still too wet for much outside work. Some new oil-line projects are under discussion, but have not taken definite shape. General oil-field business, however, has picked up well, as an advance in oil prices has encouraged new drilling.

Cast-Iron Pipe.—General business from corporations, etc., continues to improve, and several new municipal inquiries have appeared. The United States Cast Iron Pipe & Foundry Company has taken the Vallejo order, and the town of Antioch has just placed a contract for a fire protection system. Phoenix, Ariz., has taken figures on 700 tons; Douglas, Ariz., will take bids March 14 for 800 tons, and Tucson, Ariz., is figuring on a 27,800-ft. conduit, 16 and 30-in., taking bids on cast iron, concrete and steel. A proposition for water system extension by the city of San Francisco has been temporarily held up.

Pig Iron.—Foundry business is gradually gathering headway, and deliveries on old contracts are proceeding much more rapidly than last month, causing a slight reduction in the tonnage held by importers. No new purchases of any consequence are being made, however, and offerings on the spot are still excessive, preventing any firmness in regard to values.

Coke.—There is very little business, either for immediate or future delivery. German Syndicate coke for spring loading is 50c. to \$1 per ton lower, and the apparent weakness, together with the prevalent tendency to caution, does not encourage contracting in advance. Foundry requirements are increasing a little, but most consumers are well supplied. German Syndicate coke, ex yard, remains at \$13 to \$14 per net ton; for spring loading, \$10.50 to \$11 per gross ton.

Old Material.—Local consumers of steel melting scrap are still holding off, and there is no movement of any consequence except for export. Dealers have accumulated a rather large tonnage, but give no visible indication of weakening in their views as to prices, at least as to the more desirable classes of material, for which about \$12 per gross ton is asked. Cast-iron scrap is moving a little more freely at the recent decline, but the demand is not heavy. Sales are being made around \$16.50 to \$17 per net ton. The limited supply of rerolling rails is closely held by dealers at \$16.50 per net ton, wrought scrap standing as before, at \$13 to \$15 per net ton.

New York

NEW YORK, March 17, 1914.

Pig Iron.—Demand has fallen off and the market is weaker. There are indications that some foundries contracted in December for more iron than they can use, and requests for the holding up of shipments on contracts are more numerous. Eastern foundries may not have bought a full supply for the first half to the extent that is reported in the Central West, but there is at least no present indication that any considerable amount of buying remains to be done for the next three months. One fair-sized inquiry for malleable iron which appeared in New England two weeks ago has been withdrawn for the time being. Some iron has been sold in New England lately for textile machinery castings. New England foundries took several thousand tons in all of the Nova Scotia iron which was offered a few weeks ago, but that is temporarily withdrawn from sale, anticipated shipments being held back by the locked up condition of the Bay of Fundy. Buffalo iron can be had at less than the \$13.50 basis which some sellers there have tried to maintain in recent weeks, sales of the lower silicon irons from that district being reported in New England at \$15.25 to \$15.50, delivered, the freight being \$2.45. The eastern Pennsylvania steel company which has been a free seller of foundry iron for some time at prices which some

smaller producers could not meet has been a less vigorous competitor of late, a large tonnage of iron on yard having been disposed of. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$14.75 to \$15.25; No. 2 plain, \$14.50 to \$14.75. Southern iron is on the basis of \$15.25 to \$15.75 for No. 1 and \$15 to \$15.25 for No. 2.

Finished Iron and Steel.—The low level of new buying is showing its effect in a softening of prices so that there appears to be no difficulty in making purchases in shapes and plates on a basis of 1.15c., Pittsburgh, and in fact offers of less than 1.10c. have been made. The gradual settlement of a number of structural steel projects which have been before the trade for some time is also taken to indicate recent concessions. Specifications on contracts are only fair and altogether the trade is waiting for evidences of building developments usually coming with the opening of spring. Quite a long list of fabricated steel contracts closed may be mentioned, totaling about 14,000 tons: 5000 tons for the Johnson-Kahn building to Post & McCord; 1200 tons for the Fulton Bag & Cotton Company, Brooklyn, to Levering & Garrigues Company; 1000 tons for the Munsey Building, Washington, to the Jones & Laughlin Steel Company; 700 tons for the Binghamton high school, to the Jones & Laughlin Steel Company; 600 tons for the Delaware, Lackawanna & Western, Buffalo, to the Pennsylvania Steel Company; 600 tons for a Strauss bridge at San Francisco, to Milliken Brothers; 400 tons for the India Wharf Brewing Company, Brooklyn, to the Hinkle Iron Company, which has also taken 350 tons for schoolhouse 178, Brooklyn; 400 tons for schoolhouse 169, Brooklyn, to the Eastern Steel Company; 400 tons for the Lehigh Valley, Weedsport, N. Y., to the American Bridge Company; 400 tons for coal towers, New York Edison Company, to Milliken Brothers; 450 tons for a theater and apartment house, New Haven, to Levering & Garrigues Company; 350 tons, Monroe Hotel, Norfolk, Va., to Dietrich Brothers; 800 tons for the High School of Commerce, Boston, to the New England Structural Company, which has 300 tons for the Haverhill National Bank, Haverhill, Mass.; 400 tons for a Kingston, N. Y., school, to the Hedden Iron Construction Company; 400 tons for wireless towers at Boston, Washington, Key West, etc., to A. W. Kurz. Bids for 9500 tons of subway work in Brooklyn are to be taken March 27; bids on 1000 tons for a high school in the Bronx are to be taken March 23; the George A. Fuller Company has the general contract for a 12-story office building in Houston, Texas, for the Texas Company, involving 1200 to 1500 tons; the New York Central has taken figures for a number of bridges now totaling about 2000 tons; a commercial building, requiring 400 tons is to be built by Oscar Michaels in Newark, and a 12-story loft building at 125 West Forty-eighth street, taking perhaps 600 tons, is under consideration and new figures are being taken for the State Forestry Building, 300 tons, Syracuse. In railroad cars the Southern has placed 1750 with the American Car & Foundry Company; 500 with the Mt. Vernon Car Mfg. Company and 1125 with its own Lenoir car works. The St. Louis Southwestern has bought 1500 box, 400 flat and 100 general service from the American Car & Foundry Company. The Pittsburgh Railways has divided 100 traction cars equally between the Standard Steel Car Company and the Pressed Steel Car Company. The Atlantic Coast Line has placed 15 passenger cars with the American Car & Foundry Company and 200 underframes with the Cambria Steel Company. The Pressed Steel Car Company has taken 60 ore cars for Chile for the American Smelting & Refining Company and the Ralston Steel Car Company 475 underframes for the Virginian. The Bessemer & Lake Erie is in the market for 1500 hopper and 1000 gondola cars and the Denver & Rio Grande for 500 to 1000 general service cars. In connection with 500 box cars for the Central of Georgia, the Illinois Central is expected to buy 2000 to 2500 box cars. We quote mill shipments of plates and structural material at 1.15c. to 1.20c., Pittsburgh, or 1.31c. to 1.36c., New York; steel bars at 1.20c. to 1.25c., Pittsburgh; iron bars, 1.27½c. to 1.35c., New York. We quote iron and steel bars from store at 1.90c. to 1.95c. and shapes and plates, 1.95c. to 2c.

Ferroalloys.—Business in English 80 per cent. ferromanganese is very light, being confined to a few sales of small lots at \$39, seaboard. The German product can be secured at \$38, seaboard. There are a few sales of 100-ton lots of 50 per cent. ferrosilicon at the prevailing quotations of \$73, Pittsburgh, for car loads; \$72 for 100 tons and \$71 for 600 tons and over.

Cast-Iron Pipe.—The New York Department of Water Supply, Gas and Electricity will open bids March 23 on 1650 tons of pipe, 75 tons of fittings and 120 tons of special castings. Springfield, Mass., will open bids March 31 on 1416 tons of pipe. The lowest bidder on 8000 tons of 37-in. pipe at Rochester, N. Y., March 11, was the Donaldson Iron Company, at \$21.80 per net ton, delivered. The next nearest bidder was but 20c. per ton higher. At latest advices the contract had not been awarded. Pipe manufacturers are competing sharply on all public lettings, and on this class of work low prices are being made. A goodly number of small inquiries are coming out from private buyers. Carload lots of 6-in. are still quoted at \$22 to \$23 per net ton, tidewater.

Old Material.—Lacking the stimulus of even a feeble demand from consumers, the market is weak. Practically no transactions are reported. The outlook is not regarded with much confidence, as while the approach of spring may bring with it a better movement in finished products it is felt that the supply of old material will become more abundant and prices may be correspondingly depressed. Rejections of deliveries on contracts are numerous, indicating that consumers are being offered cheaper material. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	\$8.75 to	\$9.25
Heavy melting steel scrap	8.75 to	9.25
Relaying rails	21.50 to	22.00
Rerolling rails	11.00 to	11.50
Iron car axles	19.50 to	20.00
Steel car axles	13.00 to	13.50
No. 1 railroad wrought	11.00 to	11.50
Wrought-iron track scrap	9.75 to	10.25
No. 1 yard wrought, long	9.25 to	9.75
No. 1 yard wrought, short	8.75 to	9.25
Light iron	3.50 to	4.00
Cast borings	6.00 to	6.50
Wrought turnings	6.00 to	6.50
Wrought pipe	8.50 to	9.00
Carwheels	11.50 to	12.00
No. 1 heavy cast, broken up	11.50 to	12.00
Stove plate	8.50 to	9.00
Locomotive grate bars	7.50 to	8.00
Malleable cast	8.00 to	8.50

British Iron Trade Very Dull

Friction Reported in Scotch Steel Makers' Association Over Price Cutting

(By Cable)

LONDON, ENGLAND, March 18, 1914.

Russia is reported to have purchased heavily of German pig iron. In this country trade continues very dull. Little is being done in semi-finished and finished steel. A good deal of friction is reported in the Scotch Steel Makers' Association regarding alleged price cutting on plates. Stocks of pig iron in Connal's stores are 129,546 gross tons, against 130,654 tons one week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. (\$3.16), against 13s. 1½d. (\$3.19) one week ago.

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 50s. 5d. (\$12.26).

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 50s. 9d. (\$12.34).

Hematite pig iron, f.o.b. Tees, 62s. (\$15.09).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. (\$21.89).

Steel bars, export, f.o.b. Clyde, £6 (\$29.20).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 15s. (\$27.98), against £5 17s. 6d. (\$28.59), one week ago.

Steel ship plates, Scotch, delivered local yards, £6 17s. 6d. (\$33.46).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. (\$42.58).

Steel rails, export, f.o.b. works port, £5 17s. 6d. (\$28.59), against £5 19s. (\$28.95) one week ago.

The following prices are per export ton of 1015 kilos, equivalent to 2237.609 lb.:

German sheet bars, f.o.b. Antwerp, 81s. (\$19.70).

German 2-in. billets, f.o.b. Antwerp, 76s. (\$18.48).

German basic steel bars, f.o.b. Antwerp, £4 8s. to £4 9s. (\$21.41 to \$21.65), against £4 10s. (\$21.90) one week ago.

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. (\$24.82 to \$25.55).

(By Mail)

Lower Coke Means More Pig Iron—Continental Weakness in Steel a Menace

LONDON, March 6, 1914.

The pig-iron market certainly has not undergone any improvement within the past week or two; indeed, the trend of affairs in Cleveland has been if anything less favorable, and in place of the modified hope felt that things really might have seen their worst, there is a renewed feeling of pessimism growing up, which arises in part from the weakening of coal and coke, inducing blast furnace owners to put stacks into active operation which for months have been cold. A number of furnaces have already gone into operation in Cleveland and Scotland, and others are to follow suit within the next few weeks. It is impossible to resist the conclusion that there must speedily be a marked addition to the quantities of pig iron held in the stores, unless trade demands undergo a very distinct improvement. It is hoped that with the approach of the spring shipping season there will be a great broadening out in trade buying, both on home and foreign account. The situation on the Continent is, however, anything but pleasant and some very low prices are taken at times by merchants, who recently sold a round lot of German hematite to Wales in competition with British works. The increase in the German pig iron stocks during recent months shows how bad things have been, and still are there, even when due allowance is made for the fact that the deliveries in January were exceptionally poor, owing to the terrible weather and the heavy snow fall, causing a serious interruption to traffic. In England, however, there has been nothing but a very mild winter.

The tone of the market for half finished steel is possibly a shade better, but the leading producers talk a good deal more bullishly than circumstances appear to warrant. All along they have spoken as if there could not be any material reduction in prices, even at a time when they refused 110s. (\$26.73) a ton f.o.b. for sheet bars. It is a long cry from there to the 78s. (\$19.01) which they accepted not long ago; and really, although at present the price is a trifle above this, there is not much real change for the better. It must be admitted, however, that the worst points of the depression were brought about by the competition of needy French works, which have been for months past dribbling out sheet bars and billets at beggarly prices, thus keeping down the market all round. Just now again these sellers seem to have a little more starch in them, and they would not sell below 80s. (\$19.50) or so f.o.b. But one never knows, and if history is to repeat itself it would not be surprising to find the same sellers in a week or so at 78s. (\$19.01) again. All round buying of semi-finished steel is very poor, and consumers appear to be well covered for the near future, the main inquiry coming from the galvanizers for third quarter and second half shipment, deliveries which producers are not at all prepared to quote for since they are holding out still in the hope of a swift and substantial alteration for the better. The curtailed output of galvanized sheet and tin plate is not a bull point for steel.

Generally there is a lack of work on the books of the finished steel makers, but no weakening is seen in the position of prices, which show a fair amount of resistance to the unfavorable conditions prevailing. Continental steel products are offered at low rates and no improvement in the general market is possible till Germany turns well round the corner.

German Market Still Soft

Export Prices Lower and Mills Hungry for Home Orders—Pig-Iron Shipments Larger

BERLIN, March 6, 1914.—Export prices are again lower. The Cologne Gazette gives the following export prices, as compared with those of last week: Steel bars, 90 to 91 marks (\$21.42 to \$21.66), against 91 to 92 marks (\$21.66 to \$21.90); heavy plates, 99 to 100 marks (\$23.56 to \$23.80), against 100 marks (\$23.80); plates, Nos. 12 to 14, 105 to 106 marks (\$24.99 to \$25.23), against 106 marks (\$25.23); plates No. 20, 124 to 125 marks (\$29.51 to \$29.75), against 125 to 126 marks (\$29.75 to \$29.99); rivet bars, 92 to 93 marks (\$21.90 to \$22.13), against 93 to 94 marks (\$22.13 to \$22.37); ordinary wire, No. 0 to 8, 117.50 marks (\$27.97), against 120 marks (\$28.56). These prices are all to be understood for free on board at Antwerp.

The Steel Works Union held its monthly meeting yesterday and gave out a survey of the market position, which is summarized as follows: Shipments of semi-finished steel have improved since navigation of the Rhine was re-opened. A relatively good run of calls for shipment is expected for March. Nevertheless, home mills that consume semi-finished steel have not been able to increase their bookings, and for that reason are buying steel in only a hesitating way. The sale of such material for the home market was declared open at unchanged prices. The foreign demand for steel material has grown more quiet. Some large foreign orders in rails have been taken and it is expected that important schemes for building railroads in the German colonies will bring considerable orders for rails. Specifications on orders for rails for mines and for temporary trackage have been coming in more freely, but the foreign market for these products is still feeling the effects of sharp Belgian competition. No considerable change has occurred in structural steel; but shipments are already running somewhat above those of a year ago, and the volume of incoming specifications is slowly increasing, foreign markets participating duly in the increase.

Market reports all say that buying is very sluggish, not only in structural shapes, but also in nearly all other products. It is probable that products not controlled by strong trade organizations are being sold at lower prices than recently quoted, for the reports mention the fact that the mills are making great exertions to obtain orders and that prices are an uncertain quantity.

Reports from the ore market are unsatisfactory. Buying is very light, and prices are weak. The furnaces are covering their requirements only for short periods ahead inasmuch as the orders of the Pig Iron Syndicate are small and do not permit it to assign large production quotas to the furnaces.

From the Lorraine-Luxemburg district it is reported that the home trade in pig iron has become more active. The shipments of the Pig Iron Syndicate in February reached about 75 per cent. of allotments, comparing with 71.38 per cent. in January. The Gutehoffnungshütte will soon begin the construction of two furnaces at Monhofen, near Diedenhofen in Lorraine; and it is planning to add gradually steel plants and mills and develop the undertaking into a great mixed establishment.

The organization of bar-iron producers in the Rhine-Westphalian district met last week and adopted an unchanged scale of prices for the next quarter, namely, 138 to 141 marks (\$32.84 to \$33.56). It was mentioned that business is upon the whole satisfactory.

According to the latest reports, the outlook for the prolongation of the Wire Rod Association was made much worse by the meeting held a week ago. It appears now that the community-of-interest arrangement projected by five large producers is looked upon by the mills not in it as a grave menace to the organization. The five have already made agreements with 25 wire works and expect to get 10 more to join them. This would give such an advantage to the five producers of

rods that the other mills would not have any interest in keeping the organization in existence. A decision of the matter was postponed to a later meeting, as the five works were not yet ready fully to disclose their plans.

Boston

BOSTON, MASS., March 16, 1914.

Old Material.—The market has not changed, except that sentimentally it is somewhat weaker. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	\$8.75 to	\$9.00
Low phosphorus steel	13.75 to	14.75
Old steel axles	13.25 to	13.75
Old iron axles	21.25 to	21.75
Mixed shafting	12.75 to	13.00
No. 1 wrought and soft steel	9.00 to	9.25
Skeleton (bundled)	6.00 to	6.50
Wrought-iron pipe	8.25 to	8.50
Cotton ties (bundled)	7.25 to	7.75
No. 2 light	3.75 to	4.25
Wrought turnings	5.50 to	6.00
Cast borings	5.75 to	6.25
Machinery, cast	11.25 to	11.50
Malleable	8.00 to	8.25
Stove plate	7.75 to	8.00
Grate bars	6.25 to	6.50
Cast-iron carwheels	11.00 to	11.25

Buffalo

BUFFALO, N. Y., March 17, 1914.

Pig Iron.—The market continues quiet. In a few foundry lines a greater degree of activity is noted than had been expected and these foundries are asking for iron for immediate needs that was booked for deliveries as far ahead as May. Others, however, are asking shipments to be held back. Furnaces still show a disposition to take no interest in overtures for bookings beyond July 1 and decline to quote for last half deliveries. One producing interest announces that it will hereafter make more of a specialty of high silicon iron, which it will now be able to place on the market with silicon up to 5 per cent., quoting a range of 4 to 5 per cent. silicon at \$14.75 to \$15, f.o.b. cars, Buffalo, for early shipment. While furnace companies generally are endeavoring to get an advance, asking 50 to 75c. more, quotations are continued as follows, f.o.b. furnace:

No. 1 foundry	\$13.50 to	\$14.00
No. 2 X foundry	13.25 to	13.75
No. 2 plain	13.00 to	13.25
No. 3 foundry	13.00 to	13.25
Gray forge	12.75 to	13.25
Malleable	13.25 to	13.75
Basic	13.50 to	14.00
Charcoal	15.75 to	16.75

Finished Iron and Steel.—Specifications continue in moderate quantities. New buying, however, is almost at a standstill, except for material required for specific construction work, for which there has been an increased demand, particularly for reinforcing bars. Much interest is expressed by local buyers as to whether the advance of \$1 for second quarter delivery which was incorporated in some contracts for bars, plates and shapes closed during the first quarter would be realized, or whether the market will stay at first quarter prices. This will be determined within the next two weeks. Placement of fabricated structural contracts for the week has been light, but a considerable total of new work is in sight. Bids will be opened the latter part of the month for an assembly hall for Allen E. Klopp, Buffalo, requiring about 100 tons; also for 100 tons for a bottling house addition for the Schreiber Brewing Company, Buffalo, and 100 tons for a public school building at Sloan, N. Y., a suburb of Buffalo.

Old Material.—The market is weak. The principal local consumer of heavy melting steel is out of the market temporarily, and other lines in the list show a

slackening in activity and a weakening tendency in prices. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$10.00 to \$10.50
No. 1 railroad and machine cast scrap	12.00 to 12.50
No. 1 railroad wrought scrap	11.50 to 12.00
Old steel axles	16.00 to 16.50
Old iron axles	21.50 to 22.00
Carwheels	12.00 to 12.50
Railroad malleable scrap	10.75 to 11.25
Machine turnings	5.75 to 6.25
Heavy axle turnings	7.75 to 8.50
Cast-iron borings	6.25 to 6.75
Low phosphorus steel scrap	15.00 to 15.50
Old iron rails	15.00 to 15.50
Boiler plate sheared	11.50 to 12.00
Bundled sheet scrap	6.25 to 6.50
Stove plate (net tons)	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
No. 1 busheling scrap	9.00 to 9.50
No. 2 busheling scrap	6.50 to 7.00
Wrought pipe	8.00 to 8.50

Metal Market

NEW YORK, March 18, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

Copper, New York	Electro-		Tin,		New		Lead		Spelter	
	Lake	New York	New York	St. Louis	New York	St. Louis	New York	St. Louis	New York	St. Louis
Mar. 12	14.75	14.25	37.70	4.00	3.90	5.30	5.15			
13	14.75	14.12 $\frac{1}{2}$	37.70	4.00	3.90	5.30	5.15			
14	14.75	14.12 $\frac{1}{2}$	37.80	4.00	3.90	5.30	5.15			
15	14.75	14.12 $\frac{1}{2}$	38.05	4.00	3.90	5.30	5.15			
16	14.75	14.12 $\frac{1}{2}$	38.20	4.00	3.90	5.30	5.15			
17	14.75	14.12 $\frac{1}{2}$	38.40	4.00	3.90	5.30	5.15			
18	14.75	14.25	38.40	4.00	3.90	5.30	5.15			

Copper shows greater strength, following good buying. Tin has advanced, although buying has been light. Lead is dull but strong. Spelter is inactive but fairly firm. Antimony is dull and shows weakness.

New York

Copper.—In the latter part of last week and the first two days of this week excellent business was done, both foreign and domestic buyers taking the metal with perhaps the bulk of it going to domestic consumers. The buying was started for no other reason, so far as can be ascertained, than the low price which on Friday of last week was 14.12 $\frac{1}{2}$ c. for electrolytic. The movement caused one seller to advance his price yesterday to 14.25c., cash, and others followed. The quotation for electrolytic to-day is 14.25c., cash New York, or 14.37 $\frac{1}{2}$ c., delivered, 30 days. The market abroad is strong to-day at prices equal to 14.50c., delivered, 30 days. Lake is difficult to find, with choice brands selling at 15c. cash, or upward when sales are made. Other brands have sold at 14.75c. In the trade generally there is a feeling that the turn has come in the market and that better conditions may be looked for from now on despite the fact that the demand for finished products is not what it should be. The exports continue heavy, totaling this month 24,854 tons. The London quotations to-day are £64 11s. 3d. for spot and £65 for futures.

Tin.—Although there has not been much buying, sentiment seems to have changed and prices are stronger. The only reason apparent for the greater strength is that the market successfully resisted going lower than it did. Inquiries are more numerous, especially for futures, and these will result in a large business if they develop. Last week London was buying in this market, but conditions have now changed. On Saturday last about 200 tons were sold for future delivery and yesterday there again was fair buying of futures. The New York quotation to-day is 38.40c. and those in London are £174 15s. for spot and £176 15s. for futures. Arrivals this month total 3581 tons and there is afloat 3227 tons.

Lead.—The market has been very dull but it is nevertheless firm at 4c., New York, and 3.90c., St. Louis. There is nothing to be had under these prices. Offers of 3.87 $\frac{1}{2}$ c., St. Louis, have been refused, although there are sellers at 3.90c. With the London market as strong as it is, there is little likelihood of lower prices and any improvement in general conditions here would mean an advance. Exports have continued.

Spelter.—Inquiry has become much lighter and the

market is quiet but firm at 5.30c. to 5.35c., New York, and 5.15c. to 5.20c., St. Louis.

Antimony.—All the indications are that consumers are amply supplied with antimony and the market is dull. Hallett's is easier at 6.75c. to 7c., with Cookson's quoted at 7.20c. to 7.25c., and Chinese and Hungarian brands at 6c. to 6 $\frac{1}{2}$ c.

Old Metals.—The market is a little stronger in sympathy with the better feeling in new metals. Dealers' selling prices, however, have not been changed and are as follows:

	Cents per lb.
Copper, heavy and crucible	13.75 to 14.00
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.75 to 13.00
Brass, heavy	9.00 to 9.25
Brass, light	7.75 to 8.00
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.75 to 9.00
Composition turnings	11.25 to 11.50
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	4.25

Chicago

MARCH 16.—Trading in the metals during the week was light and the general position as to values, weaker. Quotations for Lake copper, although purely nominal, are not quotably lower. For casting we have reduced our quotation. Tin, spelter and zinc are likewise lower. We quote as follows: Casting copper, 14.50c.; Lake copper, 15c., for prompt shipment; small lots, $\frac{1}{4}$ c. to $\frac{1}{2}$ c. higher; pig tin, carloads, 38.75c.; small lots, 40.75c.; lead, desilverized, 4c., and corroding, 4.25c., for 50-ton lots; in carloads, $2\frac{1}{2}$ c. per 100 lb. higher; spelter, 5.20c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, \$7.00, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 11c.; copper clips, 11.25c.; red brass, 11.25c.; yellow brass, 8.25c.; lead pipe, 3.50c.; zinc, 3.50c.; pewter, No. 1, 25c.; tinfoil, 28c.; block tin pipe, 31c.

St. Louis

MARCH 16.—The metal market has been quiet. Lead is quoted at 3.90c.; spelter, 5.15c.; Lake copper, 14.60c. to 14.70c.; electrolytic copper, 14.50c. to 14.60c.; tin, 38.25c. to 38.55c.; Cookson's antimony, 7.60c. In the Joplin ore market the tendency was toward weakness, the best figure for the choicest lots of zinc blende being reported at \$43 per ton, with the range from \$38 to \$40.50. Calamine was weak at \$19 to \$21, with the best lots, based on 40 per cent., selling up to \$25. Lead ore was unchanged at \$50 on a basis of 80 per cent. On miscellaneous scrap metals we quote as follows: Zinc, 2.75c.; lead, 3c.; tea lead, 2.75c.; pewter, 22c.; tinfoil, 29c.; light brass, 4.50c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9c.; heavy copper and copper wire, 10c.

Dividends Declared

The Yale & Towne Mfg. Company, 1 $\frac{1}{4}$ per cent., payable April 1. Previous dividend was 1 $\frac{1}{4}$ per cent. and 1 per cent. extra, declared in December.

The E. W. Bliss Company, regular quarterly, 2 per cent. on the preferred and 1 $\frac{1}{4}$ per cent. on the common stock, both payable April 1.

The Crucible Steel Company of America, regular quarterly, 1 $\frac{1}{4}$ per cent. on the preferred stock, payable March 31.

The United States Cast Iron Pipe & Foundry Company, regular quarterly, 1 per cent. on the preferred stock, payable to stock of record April 4.

Manning, Maxwell & Moore, Inc., regular quarterly, 1 $\frac{1}{2}$ per cent., payable March 31.

Reports that prices on chain have been advanced from \$4 to \$5 a ton are incorrect. No advances have been made in the price of chain since February 17, on which date the price of $\frac{1}{2}$ -in. proof coil chain to the retail trade was fixed at 4.05c., Pittsburgh, the usual differentials on all sizes being allowed to the large trade.

Iron and Industrial Stocks

NEW YORK, March 18, 1914.

A few of the industrial stocks have shown decided strength. Westinghouse Electric was conspicuous in making a gain of about \$6 per share. Other strong stocks were Bethlehem Steel and the equipment stocks. In most securities, however, fluctuations have been slight from day to day, speculative influences apparently waiting for some development that might throw light on the future. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	$12\frac{1}{4}$ - 13	Nat. Enam. & St., com.	$11\frac{1}{2}$ - 12
Allis-Chal., pref.	46 - 47%	Pittsburgh Stl., pref.	92
Am. Can., com.	$28\frac{3}{4}$ - 30%	Pressed Stl., com.	$42\frac{1}{2}$ - 43%
Am. Can., pref.	$92\frac{1}{2}$ - 94%	Pressed Stl., pref.	104
Am. Car. & Fdy., com.	49% - 51%	Ry. Spring., com.	28 - 31%
Am. Car. & Fdy., pref.	117	Republic, com.	$25\frac{1}{4}$ - 26%
Am. Loco., com.	$33\frac{1}{2}$ - 35%	Republic, pref.	$90\frac{1}{4}$ - 91%
Am. Loco., pref.	102	Rumely Co., com.	$13\frac{1}{2}$ - 15%
Am. Steel Fdries.	$33\frac{1}{2}$ - 34	Rumely Co., pref.	33 - 38
Bald. Loco., com.	49% - 51%	Sloss, com.	31 - 32%
Bald. Loco., pref.	107%	Pipe, com.	11%
Beth. Steel, com.	42 - 44%	U. S. Steel, com.	$63\frac{1}{4}$ - 64%
Beth. Steel, pref.	83 - 86	U. S. Steel, pref.	109% - 110
Case (J. I.), pref.	88 - 89	Va. I. C. & Coke.	50%
Colorado Fuel.	$31\frac{1}{2}$ - 33%	West Ghse Elec.	$72\frac{1}{2}$ - 78%
Deere & Co., pref.	$94\frac{1}{2}$ - 96%	Chic. Pneu. Tool.	58%
General Electric.	147 - 148%	Cambria Steel.	49% - 50
Gt. N. Ore Cert.	36 - 37%	Lake Sup. Corp.	21 - 31%
Int. Harv., com.	103% - 106	Warwick.	10%
Int. Harv., pref.	117%	Cruc. Steel, com.	$16\frac{1}{2}$ - 16%
Int. Harv. Corp.	103% - 105	Cruc. Steel, pref.	94% - 95%
Int. Pump, com.	7	Harb.-Walk. Ref.	52%
Int. Pump, pref.	23%	Harb.-Walk. Ref., pref.	99
		La Belle Iron, com.	43% - 43%

THE USE OF HEAVY OIL FUEL*

Need of Uniform Regulations Governing the Location of Storage Tanks

The advent and popularity of automobiles and oil engines have created such a demand for by-products of fuel oil that it has now become too valuable to be used as fuel, notwithstanding its excellent quality. The manufacturing world must, therefore, install in future some system by which heavier oils can be used, and especially petroleums from the Mexican and southern California fields, which are particularly available as fuel, because they contain so small a proportion of volatile oil, gasoline, kerosene, etc. Analyses of California and Mexican crude oils are given in the accompanying table. The completion of the Panama Canal will, no doubt, result in vast quantities of this fuel being delivered to the southern and Atlantic ports of the United States.

Analyses of Liquid Fuels

	California asphaltum base	(Tampico Field) crude oil	Mexican crude oil
Fuel oil	84.35	81.52	83.83
Carbon, per cent...	11.33	11.01	12.19
Hydrogen, per cent...	2.82	..	0.43
Oxygen, per cent...	0.60	6.92	1.72
Nitrogen, per cent...	0.90	0.55	2.83
Gravity, degrees Baume	26 to 28	12 to 36	12 to 23.8
Weight, pounds per gallon	7.3	7.6	7.82
Calorific value, B.t.u. per lb.	18,350 to 19,348	18,462 to 18,980	18,493
Vaporizing point, degrees F.	130	230	175

Efforts have been made in the eastern parts of the United States during the past year and a half to burn the heavy petroleum from the Mexican fields, which has an average gravity of 14 deg. Baumé. Through ignorance, when attempting to use this oil, no means were provided for heating the fuel in the storage tank; the oil pump which had been used for ordinary fuel was not changed to adapt it for a heavier fuel; the oil pipe lines were not laid so that the

*From a paper presented to the American Institute of Mining Engineers, New York, February 19, by William Newton Best, New York City.

fuel would be constantly in circulation. The object of heating the crude oil is to reduce its viscosity, and it should be heated in the storage tank to a temperature that will allow it to be pumped easily. The oil is also heated in the supply and overflow pipes by running a steam pipe alongside of them, and inclosing both in an 8-in. square box which, when the pipes have been tested, is filled with dry sand. By regulating the amount of steam passing through the heater pipe, the oil is supplied to the burners at a temperature just below its vaporizing point. When the pipes are inclosed in the manner described only a small quantity of steam is needed, and, by laying the steam pipe below the oil pipe in the box, it is accessible at all times.

Some prefer to heat the oil by passing a 3-in. steam pipe through the oil-supply pipe. The first cost of this is cheaper, but, if the steam pipe should leak, it is difficult to make the necessary repairs. Coating the oil-pipe threads with a paste consisting of litharge and glycerine before assembling will prevent leakage. The unions should be ground joint. Gum or rubber should never be used, and lead gaskets should be used in flanges. Malleable-iron beaded fittings should be used on all oil-pipe lines.

The advantage of accurately heating the oil to the desired temperature is shown by some tests in which a saving of 20 per cent. of Mexican crude oil required was made by heating it to 160 deg. F. (which is 10 deg. below its vaporizing point) instead of 120 deg. F. The control of temperature is so important that thermometers should be used in direct contact with the fuel as it passes to the burner. Two or three such thermometers, well located, will save much oil and increase the output of the furnaces. The overheating of the oil may readily be detected by the puffing of the burner, due to escaping vapor.

LIABILITY OF FIRE

There is less liability of fire from liquid fuel, employed in a modern fuel-supply system, than there is from the use of coal or coke, yet there are many different rules prevailing in different parts of the country for the location of oil-storage tanks. In the eastern and middle sections of our country, the law of the National Board of Fire Underwriters requires all storage tanks to be placed 30 ft. from any building and covered by 2 ft. of earth, while in San Francisco they are placed in the space formerly used for coal, immediately under the sidewalk, and are filled by oil-tank wagons or oil-tank cars from the street. Of the hundreds of oil-storage tanks located in the city of San Francisco at the time of the late earthquake and disastrous fire, not one exploded or increased the conflagration or was the direct cause of financial loss. It is impossible for many manufacturers to place oil-storage tanks 30 ft. from any building, because their buildings cover their entire ground, and the Fire Underwriters' regulation forbids them to be placed under the sidewalks.

If crude oil were as volatile as gasoline, there might be some ground for fear, but it is not. As far as the danger from dripping oil is concerned, it may be obviated by sprinkling over the floor of the pump house, and around the storage tank, a mixture of 8 lb. of sodium carbide with 1 bushel of sawdust.

The Reynolds Electric Flasher Mfg. Company, 422-428 South Talman avenue, Chicago, announces that all of the legal rights appertaining to Reco color hoods for electric lamps were sustained by the United States District Court, southern district of New York, in a decision rendered March 10. It was further shown that hoods have a distinct advantage over caps, which cover the tip of the lamp only.

Pittsburgh

PITTSBURGH, PA., March 18, 1914.

The lull in the steel business which commenced about February 15 still exists. With the return of favorable weather, the resumption of outside building operations, and the opening up of spring trade, there will no doubt be another buying movement, as it is known that the consuming trade on many lines has not covered for second quarter. The feeling as to the next three or four months in the steel business, however, is not optimistic, and while an increase in business is looked for in April, permanent improvement is not expected until late in the year. Not enough new business is coming out to test prices on either raw or finished materials. Some steel concerns are operating to from 60 to 75 per cent. of capacity, and this range probably represents the general average. On some lines of finished material, notably plates, shapes and bars, prices are not regarded as being as firm as they were in the first half of last month.

Pig Iron.—The local market is practically bare of inquiry, but a few small sales of foundry iron are being made for which \$13.50 at Valley furnace is being paid for established brands of No. 2. Sales are reported of 1200 to 1500 tons of malleable Bessemer at about \$13.25, Valley furnace, and about 600 tons of No. 2 foundry at \$13.25 to \$13.50. We quote as follows: Bessemer, \$14.25; basic, \$13; No. 2 foundry, \$13.25 to \$13.50; gray forge, \$12.75 to \$13; malleable Bessemer, \$13.25 for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Makers report the new demand for either billets or sheet bars very quiet, as practically all consumers are covered by contracts. Specifications are fair, but not so heavy as they were last month, as business with some of the sheet mills has quieted down very much. We quote Bessemer and open-hearth billets at \$21 and Bessemer and open-hearth sheet bars at \$22, f.o.b. makers' mills, Pittsburgh or Youngstown, for the rest of this quarter. We quote forging billets at \$25 on desirable specifications, embracing only one size, and up to and including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at \$26. We quote axle billets at \$23 for desirable orders and \$24 for small orders.

Muck Bar.—We hear of no sales. We quote best grades of muck bar, nominally, at \$28 to \$28.50 delivered to consumers' mills in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Company reports a fair run of orders in standard sections in small lots, but no large contracts have come out for some time. The demand for light rails is active, both the mining and the lumber interests placing orders quite freely. The Carnegie Company received last week new orders and specifications for about 2500 tons. We quote splice bars at 1.50c. and standard section rails at 1.25c. Light rails, rolled from billets, are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—While the demand is quiet, prices are firm as the supply of rods for the open market is limited. We quote Bessemer, open-hearth and chain rods at \$26.50 to \$27, Pittsburgh. Two prominent makers of wire rods are holding for \$27, minimum.

Skelp.—The falling off in new demand for tubular goods is reflected in skelp, the new inquiry for which has been dull for some time. We quote grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Iron and Steel Bars.—Makers state that the new demand for both iron and steel bars is only fair and mostly in small lots. Large consumers covered ahead for some time in the early part of February, and specifications against contracts are coming in quite freely. The demand for reinforcing bars continues active, one leading mill having booked about 4200 tons in the past week. Prices on iron bars are weaker, due to dull demand and

the lower price for puddling and forge iron. We quote steel bars for prompt shipment at 1.20c. to 1.25c., the latter price holding for delivery in second quarter, and iron bars at 1.35c., f.o.b. makers' mill, Pittsburgh. Extras for twisting reinforcing steel bars over the base price are as follows: $\frac{3}{4}$ in. and over, \$1; $\frac{1}{2}$ to $\frac{11}{16}$ in., \$1.50; under $\frac{1}{2}$ in., \$2.50 per net ton. This is the schedule of extras in force by mills that roll steel bars from billets, but mills that roll bars from old rails do not adhere to these extras, and sometimes omit them entirely.

Plates.—The general demand for plates is quiet, and all the plate mills are badly in need of orders. It is intimated that on some business recently placed several of the smaller plate mills named 1.15c. at mill. We quote $\frac{1}{4}$ in. and heavier plates at 1.20c., while for second quarter delivery the Carnegie Steel Company is quoting 1.25c. at mill. On desirable orders for some sizes 1.15c. is being named by some of the smaller mills.

Structural Material.—New inquiry for work has quieted down recently, but some fair sized jobs were placed in the past week. The American Bridge Company took a county bridge at McKees Rocks in this city, 1100 tons; the Riter-Conley Mfg. Company has taken 1800 tons for a new warehouse for the H. J. Heinz Company on the North Side, for which it furnished the plans, and 900 tons for new buildings for sheet mills for the Trumbull Steel Company, of Warren, Ohio. The McClintic-Marshall Company has taken about 1000 tons for electrification work for the Pennsylvania Railroad between Paoli and Philadelphia. Local work in the market includes the Grant Exchange telephone building, about 3500 tons, also a new hotel to be built on Oliver avenue, probably 8000 tons, and some county buildings on Grant street, which may eventually take upward of 10,000 tons. Prices on structural material are only fairly steady. We quote beams and channels up to 15 in. at 1.20c. to 1.25c., f.o.b. Pittsburgh.

Ferroalloys.—Most consumers are covered on ferromanganese up to July 1, in some cases through the entire year, and two or three of the largest consumers are covered up to April of next year or longer, so that new inquiry is very quiet. New York importers are quoting \$38, seaboard, for 80 per cent. English ferromanganese, but this price could likely be shaded on a firm offer and about \$37 could be done with a freight rate to Pittsburgh of \$2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$73; over 100 tons to 600 tons, \$72; over 600 tons, \$71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at \$20; 11 per cent., \$21, and 12 per cent., \$22, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Sheets.—It is intimated that some fairly large consumers of sheets have recently been able to cover April needs on the basis of about 2c. for No. 28 black and 3c. for No. 28 galvanized. None of the sheet mills has yet announced its prices on sheets for second quarter delivery, but several have refused to sell through second quarter at the above prices. Specifications against contracts are active, and shipments by the mills are heavy. Sheet mills are running on an average of 75 per cent. of capacity, but new demand has quieted down very much in the past two weeks. For March and April delivery we quote No. 28 Bessemer black sheets at 1.95c. to 2c.; No. 28 galvanized, 2.95c. to 3c.; Nos. 9 and 10 blue annealed sheets, 1.45c.; No. 28 tin mill black plate, H. R. and A., 1.90c. to 1.95c.; Nos. 29 and 30, 1.95c. to 2c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Specifications against contracts placed in December are coming in freely, and shipments by the mills are heavy. Leading tin plate makers are running practically full and have enough specifications on their books to run in this way up to July or longer. Current new orders are for small lots, as practically all consumers of tin plate have covered their needs for this year. We quote 100 lb. cokes at \$3.30 to \$3.40 and 100 lb. ternes at \$3.20 to \$3.30 per base box, f.o.b. Pittsburgh.

Wire Products.—Specifications against contracts for wire products are not as heavy as they were in February, especially in first half of that month. However, the mills look for an increase in new business early in April or about the time spring trade should start up. An advance in prices on wire products by the leading interest and the other makers is looked for at any time. We quote: Wire nails, \$1.60; plain annealed wire, \$1.40; galvanized barb wire and fence staples, \$2; painted barb wire, \$1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight charge to point of delivery, terms being 30 days net less 2 per cent. off for cash in 10 days. We quote cut nails at \$1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots, 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—Only small lots are being bought, to cover current needs, as the large consumers are pretty well covered through second quarter, and specifications against contracts on both hoops and bands are reported to be quite active. We quote steel bands at 1.20c., extras as per the steel bar card, and steel hoops at 1.30c., f.o.b. Pittsburgh. The Carnegie Steel Company is holding steel bands at 1.25c. for delivery in second quarter.

Shafting.—The market is quiet. Specifications from the automobile trade are reported quite active, but from the implement makers are unsatisfactory. We quote cold-rolled shafting in carload and larger lots at 63 to 64 per cent. and in small lots from 60 to 62 per cent. off delivered in base territory, depending on the order.

Spikes.—No large orders have lately been placed, but several leading Western roads have inquiries out for fairly large lots. The makers of spikes are pretty well fixed with orders over the next month or two. We quote standard sizes of railroad spikes at \$1.45 to \$1.50 and small railroad and boat spikes at \$1.55 to \$1.60, per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—New orders are coming in at a fair rate, but mostly for small lots, as the large consumers are covered ahead for the next two or three months. Prices are reported fairly strong. We quote: Iron finished tire, ½ x 1½ in. and larger, 1.35c., base; under ½ x 1½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to 7/8 and 1 in., 1.85c. to 1.95c.; 1½ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Standard Pipe.—Nearly all the country districts being frozen up and most outside work has stopped, which has materially restricted the new demand. Orders for oil well supplies are fairly heavy, and if the present mild weather lasts will no doubt soon show an increase. Discounts on iron and steel pipe are reported as being fairly well maintained.

Boiler Tubes.—The market is dull and the tube trade has been in very unsatisfactory condition for some time. Discounts are not being observed, and are more or less shaded, depending on the order.

Coke.—The market is quiet. During February consumers of furnace coke took in coke very freely, with the result that they were able to accumulate fairly heavy stocks and are now suspending shipments for short periods until this accumulation has been used up. A leading interest has sold 10,000 tons of blast furnace coke per month to a local consumer at \$2.10 per net ton at oven for April, May and June delivery. An Eastern furnace company is expected to buy in the near future 20,000 tons of blast furnace coke per month for second quarter delivery. Prices on standard grades of furnace coke are firm at \$2, up to \$2.10 for second quarter. Prompt furnace coke is offered at \$1.85 up to

\$2 per net ton at oven, depending on the quality. Selected grades of 72-hour foundry coke are \$2.50 to \$2.75 per ton at oven.

Old Material.—Most consumers are out of the market, as they have covered ahead for some time. There is some trading between dealers, mostly to cover shorts, but an increase in new demand from consumers is looked for in April. Prices have further declined, and selected heavy steel scrap is being offered for delivery to consumers, in the Youngstown, Sharon and Steubenville districts as low as \$12 per ton. We have revised prices on nearly all grades of scrap to a lower basis. We note sales of 700 tons of old carwheels at \$12.25 delivered, 200 tons of sheet bar crop ends at \$12 at loading point, about 2000 tons of heavy steel scrap at \$12.25 to \$12.50 delivered, 400 tons of wrought iron turnings at \$8.15 delivered, 500 tons of low phosphorus melting scrap at \$14.75 delivered, and about 300 tons at about \$15.25. Dealers are now quoting as follows, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	\$12.25
Compressed side and end sheet scrap	\$11.25 to 11.50
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.50 to 8.75
Rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.00 to 13.25
No. 1 railroad malleable stock	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.75 to 15.00
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	8.00 to 8.25
Old carwheels	11.25 to 11.50
Cast-iron borings	8.25 to 8.50
Sheet bar crop ends	12.00 to 12.25
Old iron rails	14.00 to 14.25
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

The International Engineering Congress, 1915, of which E. J. Dupuy, Foxcroft Building, San Francisco, Cal., is executive secretary, has issued a bulletin which states that rapid progress is being made on the programme of papers for the various sections. The first volume of publications will be descriptive of the various technical features of the design and construction of the Panama Canal. Each topic considered will be treated by some one on the canal force who has been responsible for the design and construction described. On March 1 the enrollment for the congress was slightly in excess of 1200, of which about 1000 are from the United States and over 200 from foreign countries.

According to the annual report of the Union of Swedish Ironmasters for 1913 the year was in some respects a record one for the Swedish iron and steel industry. Production materially exceeded the high figures of 1912. Pig iron output was 735,000 tons, or 35,000 tons more than in 1912, while ingots, blooms, etc., aggregated 740,800 tons, an increase of 80,600 tons. The exports for 1913 were 502,500 tons, including 207,500 tons of pig iron, 54,800 tons of ingots, blooms, etc., 215,900 tons of rolled and hammered iron and steel and 16,500 tons of scrap.

The Chicago Section of the American Chemical Society, through its secretary, D. K. French, 2005 McCormick Building, is undertaking to create a better recognition among manufacturers of the development that is possible in their business through chemistry. As a preliminary to this campaign a census is being made of all the chemists in the Chicago district and of the firms employing chemists. Manufacturers are asked to cooperate in putting such census information into the hands of the secretary.

THE INSULATION OF FURNACES

Results of Investigations Showing Savings Attained in Reheating and Other Furnaces

The impression among engineers that the firebrick lining of a furnace provides sufficient insulation in itself, and that the application of an external lagging would cost more than it saves, is entirely wrong in the opinion of Charles R. Darling as expressed in an article on "The Insulation of Furnaces" in Engineering, London. All the available data point to the conclusion that a considerable financial saving could be effected by lagging furnaces of all types.

As usually constructed, furnaces consist of a firebrick lining and an outer iron casing, and in order to arrive at an estimate of the heat escaping under working conditions, it is necessary to know the temperature of the outer surface, and the rate at which heat leaves an iron surface at the existing temperature. The former may be measured by means of a thermal-junction and calibrated galvanometer, while the latter may be derived from existing data. The heat escaping in B.t.u. per sq. ft. per hr. from an iron surface at different temperatures when the surrounding atmosphere is at 70 deg. F. is shown by a curve in the author's paper from which the following approximate figures are derived:

Temp. of surface, deg. F.	B.t.u. escaping per sq. ft. per hr.
100	60
200	320
300	700
400	1,240
500	1,900
600	2,680

Two examples are given to show the magnitude of the losses which occur in practice. The first one refers to a reheating furnace for steel, which possessed an exposed surface of 430 sq. ft., 330 sq. ft. being the sides, and 100 sq. ft. the top. The lining was of 9-in. firebrick, bound at the sides by cast-iron plates, 2 in. thick, the top being uncovered. Readings of surface and internal temperatures were taken at intervals during a week of normal working, with the following results:

	Deg. F.
Interior	1450 to 1600
Exterior plates, average	300
Exterior firebrick, average	390

Loss of heat from the iron plates at 300 deg. F. (700×330) = 231,000 B.t.u. per hr. per sq. ft. Assuming that firebrick surface radiates at the same rate as an iron surface at the same temperature, the loss from it at 390 deg. F. would be 1100 B.t.u. per sq. ft. per hr., which gives the escape per hour from the top at 110,000 B.t.u. The total loss per hour was therefore 341,000 B.t.u., which, in an average case, would represent the equivalent of 6c. worth of fuel. Assuming the furnace to be in use for a year of 300 working days of 24 hr., the financial loss due to escaping heat would amount to \$432, an item which is surely worthy of special attention.

The second example represents the results obtained with a rotary cement kiln. The external surface varied from 400 deg. F. at the hottest part to 150 deg. F. at the entrance to the flue, the average being 280 deg. The heat loss per sq. ft. per hr. was therefore 610 B.t.u., and as the area of the exposed surface was 2830 sq. ft., the total escape per hour was 1,726,300 B.t.u., equal in 24 hr. to $2\frac{1}{2}$ tons of the coal used. The heat escaping in 300 working days would therefore represent a loss of 750 tons of coal.

Experiments on an electrically heated furnace have recently been carried out by F. A. J. Fitzgerald. A firebrick furnace was heated internally by

an electric heater to several constant temperatures, the watts used being noted in each instance. A second set of readings was then taken with the exterior lagged with insulating material 1 in. thick. The results are shown in a curve from which the following approximate figures are derived:

Internal temperature, deg. F.	B.t.u. escaping per hr.	
	Furnace without lagging	Furnace with lagging
400	450	150
800	1,150	450
1,200	2,150	950
1,600	3,350	1,650
1,800	...	2,050

The saving effected is more than 50 per cent. over the whole range of temperature observed, greatly exceeding in value the cost of insulating material. Mr. Darling states, as a result of his work, that the insulation of furnaces is well worth the attention of manufacturers.

Judicial Decisions

NECESSITY FOR RECORDING CONDITIONAL SALE CONTRACT.—When a seller of machinery under a contract reserving title in him until payment of the price knows that the machinery is to be installed as a fixture in a building, he will have no right to reclaim the property as against an innocent purchaser of the real estate, unless the contract of sale has been recorded. (New York Supreme Court, Appellate Division, Fourth Department; Crocker-Wheeler Company vs. Genesee Recreation Company, 145 New York Supplement 477.)

INTEREST IN MACHINERY SUBJECT TO LEVY.—Under a lease of machinery with an option in the lessee to purchase by making certain payments, his interest is subject to levy to satisfy a claim of one of his creditors. (Massachusetts Supreme Judicial Court, Eastern Bridge & Structural Company vs. Worcester Auditing Company, 103 Northeastern Reporter 913.)

BUYER'S RIGHT TO ATTACH PROPERTY.—Where a manufacturer of beams sent shorter ones than were ordered, and the buyer, refusing to accept them, was requested to hold them for a while, they were subject to attachment in a suit brought by the buyer for breach of the manufacturer's contract to deliver beams of the required length. (New Hampshire Supreme Court, Arthur C. Harvey Company vs. Lemieux, 89 Atlantic Reporter 300.)

ADVERTISING FOR STRIKE BREAKERS.—The Massachusetts law which requires an employer in advertising for workmen during a strike at his plant to mention the fact that a strike exists is constitutional. The purpose of the statute is presumed to be to protect innocent searchers for work and not to harass employers. (Massachusetts Supreme Judicial Court, Commonwealth vs. Libbey, 103 Northeastern Reporter 923.)

RISK NOT ASSUMED BY EMPLOYEE.—An employee did not assume the risk of being injured by fall of a pipe weighing 640 lb. which he was directed by his foreman to assist two other men in moving, if he did not know the weight of the pipe or the danger involved in moving it. (Texas Court of Civil Appeals, Peden Iron & Steel Company vs. Jaimes, 162 Southwestern Reporter 965.)

EMPLOYER'S LIABILITY FOR DEFECTIVE APPLIANCES.—An employer is liable for injury to a workman caused by the negligent manner in which another employee repaired a maul, resulting in its head flying off while it was being used. (United States Circuit Court of Appeals, Eighth Circuit; Missouri Valley Bridge & Iron Company vs. Nunnemaker, 209 Federal Reporter 32.)

CAUSE OF INJURY AT UNGUARDED MACHINERY.—An employer's failure to guard machinery as required by the Indiana factory act renders him liable for a machinist's injury, resulting from his hand slipping from a lever into the unguarded machinery, although, in a sense, any negligence on the machinist's part in permitting his hand to slip may be regarded as the cause of the accident. (Indiana Supreme Court) Cincinnati, Hamilton & Dayton Railway Company vs. Armuth, 103 Northeastern Reporter 738.)

HEAVIER LOADING OF CARS

Two Tons More in a Carload Would Save One Road \$2,500,000 in a Year

Every proposition which has to do with economies in railroad operation is of timely interest. The suggestion that the efficiency of existing railroad equipment, particularly freight cars, be increased, thus obviating to an extent the purchase of new equipment is not new. But G. E. Simpson, writing in a recent number of the Employees' Magazine of the Chicago, Milwaukee & St. Paul system, more pointedly shows by figures from that railroad's last report how a saving of about \$2,500,000 can be made in one year by the addition of but two tons to each carload. A portion of the figures presented in that article tell their own story. Based upon the rated tonnage capacity of its freight car equipment, Mr. Simpson shows from way-bill records that on 49 cars of lumber 36 per cent. of carrying capacity was lost; on 38 cars of coal 9 per cent. of carrying capacity; on 48 cars of cement, 13 per cent.; on 64 cars of flour, 37 per cent., and on 61 cars of grain, 5 per cent., making an average loss of 20 per cent in 260 cars. The total freight traffic showed a failure to use within 40 per cent. of the rated car capacity. Further figures are given to show that had the loading been increased, the saving in the handling of equipment, the decrease in the number of miles run, and the reduction of general wear and tear, would have resulted in the following notable economies:

Increasing carloads	Fewer cars required	Decreased mileage resulting	Expense saved
4,000 lb. (2 tons).....	168,300	51,084,103	\$2,489,157.00
2,000 lb. (1 ton).....	84,150	25,542,051	1,244,578.00
1,000 lb. ($\frac{1}{2}$ ton).....	42,075	12,771,025	622,284.00
500 lb.	21,037	6,385,512	311,142.00
100 lb.	4,207	1,277,102	62,228.00

The average number of miles per car per day was 27, and the number of cars loaded was 1,683,000. The saving by increases of 1 to 9 miles a day are shown in the following:

	No. cars loaded	Saving, cars
Increasing 1 mi. per car per day to 28....	1,623,000	60,000
Increasing 3 mi. per car per day to 30....	1,514,000	169,000
Increasing 5 mi. per car per day to 32....	1,420,000	263,000
Increasing 7 mi. per car per day to 34....	1,336,000	347,000
Increasing 9 mi. per car per day to 36....	1,262,000	421,000

Assuming the average freight car to cost \$1000, it is apparent to what extent railroad capital accounts are affected by the conservation of 100,000 cars. At a time when prominent shippers state that not over 10 per cent. of the cars furnished them each day are really "good order" cars, and that many of the cars are repaired by the shipper at his own expense before loading, it is needless to say that the release of 100,000 cars would be a vast relief.

CAR CAPACITIES INCREASED

Within the last 20 years freight car tonnage capacities have been increased from about 30,000 lb. to an average of nearly 70,000 lb. and to a maximum of 100,000 lb. In approximately the same period, carload minimums, speaking generally, have increased only 12,000 lb., from 24,000 to 36,000, while a 30,000 lb. minimum still obtains for some commodities. In other words, the railroads have been building larger cars much more rapidly than they have been educating or influencing the shippers to use the increased capacity made available. It is admitted that many consumers buy in a small way and find considerable planning necessary in order to buy in

carload lots, even at the present minimums. The attitude of such buyers is not an easy one to combat nor is their situation always easy to adjust. Commodities of a light and bulky character also are to be considered. But a significant object lesson in what can be accomplished is not lacking. As the result of a campaign started by one of the largest manufacturers of Portland cement, during the last car shortage, an increase on that commodity was brought about from the class rate minimum of 24,000 lb. to as high as 50,000 lb. This company, finding itself compelled to make use of the maximum capacity of the cars available in order to move its product, declined to make shipments in carload lots of less than 36,000 lb. As a result of the determined campaign in this direction it was found possible and practicable without inconvenience to the consignee not only to ship a minimum of 36,000 lb. to the car, but continuously to hold shipments well up to the 10 per cent. overload allowed on the rated car capacity. By similar methods during 1913 one of the leading steel mills of the West averaged 78,000 lb. to the car on its shipments of steel.

GREATER LOADS WITH NO ADDED COST

The problem of heavier loading of cars is not one involving a further increase in the capacity of equipment. Many railroad authorities look upon any increase in the size of present rolling stock as an overload on right-of-way equipment now in place, although the Pennsylvania and Norfolk & Western railroads are now building larger cars of the battleship gondola type. It is rather a matter in which the railroads and shippers must co-operate, to the end that as few cars as possible be used for any given shipment. While the railroads will be the beneficiaries of such heavier loading of cars, most directly and to the greatest extent, the shipper is likewise benefited eventually, whenever the railroads can increase their net earnings without increasing their operating expense. That the addition of two or even more tons to each car in a train of from 25 to 50 cars will make no addition to the cost of hauling that train to destination is acknowledged.

In connection with the tentative plans of Witherbee, Sherman & Co., for the building of two blast furnaces at Boynton Beach, N. J., on the Arthur Kill, a careful investigation is now being made into the matter of fresh water supply. Woodbridge Creek flows through the proposed site, and the drainage area, record of flow and other data are being gone into thoroughly. The options on most of the property under consideration run until October.

The Logan Iron & Steel Company, Philadelphia, has appointed Terrill & Rogers, 12 Pearl street, Boston, sales agents for its bar and special shape products in the New England States.

Shipments of iron ore from Korea through the port of Chinnampo are reported to be active, totaling 135,263 tons up to December 15, 1913, an increase of 3000 tons over the previous year.

The plant of the Ft. Wayne Rolling Mills, Ft. Wayne, Ind., maker of bar products, has been shut down for 10 days to make repairs following a breakdown.

F. A. Houdlette & Son, 93 Broad street, Boston, have been appointed New England sales agents for the Warren Foundry & Machine Company.

Pittsburgh and Valleys Business Notes

The Phoenix Iron Works Company, Meadville, Pa., manufacturer of engines and boilers, has moved its Pittsburgh office to the Empire Building. It is in charge of A. J. Schroth.

Grace furnace of the Brier Hill Steel Company, Youngstown, Ohio, blew in on Saturday, March 14, after being relined and repaired. Five open-hearth furnaces out of seven in the new open-hearth plant of this company are now in operation, the sixth will be started in a few days and the seventh about April 1.

The Petroleum Iron Works Company, Sharon, Pa., is erecting an extension to its power-plant building to provide for an installation of air compressors.

The stockholders of the Oliver Iron & Steel Company, Pittsburgh, will hold a special meeting at 2 p. m., April 2, and those of the Oliver & Snyder Steel Company at 2:30 p. m. on the same date to approve a merger and consolidation of the latter company into the Oliver Iron & Steel Company. They are controlled by the same interests.

At Pittsburgh last week the Union Switch & Signal Company voted to increase the amount of its common stock from \$5,000,000 to \$10,000,000. The present board of directors was re-elected.

The Great Lakes Engineering Company, Detroit, Mich., is building a new ore boat for M. A. Hanna & Co., Cleveland, Ohio, to replace the Charles S. Price, which was lost in the great storm last year. The new boat will be named William H. Donner in honor of the president of the Cambria Steel Company.

The annual dinner of the Traffic Club of Pittsburgh will be held in Memorial Hall, Pittsburgh, March 27. Among the speakers expected are E. C. Sattley, president of the club; Daniel Willard, president Baltimore & Ohio Railroad, and John Barrett, director general of the Pan-American Union.

The Westinghouse Electric & Mfg. Company, Pittsburgh, has paid off \$1,800,000 nine-month 6 per cent. collateral notes from funds in the treasury. It is reported that the gross sales of the company in the fiscal year to end March 31 will total between \$42,000,000 and \$43,000,000, establishing a new high record.

Sheet metal workers allied with the Amalgamated Association of Sheet Metal Workers in Youngstown, Ohio, which includes tinnings and slaters, have made a demand for an increase in wages of 5c. an hour, or 40c. per day of eight hours. If the increase is granted the sheet metal workers will receive \$4 a day instead of \$3.60, after May 1.

In its financial statement for the year ended December 31, 1913, the Pittsburgh Coal Company makes the best showing it has made since 1907. For the first time it includes figures of its subsidiary, the Monongahela River Consolidated Coal & Coke Company. The statement shows gross earnings of \$36,266,146; net earnings, \$6,421,703; balance for dividends, \$2,726,269; total surplus, \$10,526,113.

The Carnegie Steel Company is now operating 41 out of its 58 blast furnaces. No. 3 at Duquesne was blown in March 2 and Edgar Thomson H at Bessemer, March 10. All six at Duquesne and seven at Carrie are now in operation.

The report that the H. C. Frick Coke Company had recently bought 10,000 acres of coal lands in Greene County, Pa., and had secured an option on 15,000 acres more is untrue. The company has long owned about 15,000 acres in that county, but has not bought any coal land there or elsewhere for several years. It does not contemplate building any coke ovens in that county at present. H. C. Frick, for his personal account, however, has bought 10,000 acres in Greene County from J. V. Thompson, Uniontown, Pa. The price was about \$200 an acre instead of \$600 as reported.

The Mesta Machine Company, Pittsburgh, has received an order from the Andrews & Hitchcock Iron Company, Youngstown, Ohio, for two horizontal cross-compound blowing engines with high-pressure steam

cylinders 48 in.* in diameter, low pressure 84 in., air cylinders 84 in., and stroke 60 in., equipped with the Mesta automatic plate valves, Iversen patent. They will be installed at the furnace at Hubbard, which is being rebuilt and enlarged. They will be exact duplicates of the two engines recently furnished in record time for the Woodward Iron Company, Woodward, Ala., which are now in operation and giving excellent results. The Mesta Company also recently received an order from the Portsmouth Steel Company, Portsmouth, Ohio, for a tandem compound Corliss engine, with high-pressure steam cylinder 34 in. in diameter, low-pressure 60 in. in diameter, and a 60-in. stroke, to be used for driving the new bar mill. Another order received is from the Winchester Repeating Arms Company for a Mesta patented low type pickling machine for pickling gun barrels and small gun parts. Heretofore the Winchester Company did all its pickling by hand.

The third monthly meeting of the Pittsburgh Section of the Association of Iron and Steel Electrical Engineers was held at the Seventh Avenue Hotel, Pittsburgh, on the evening of March 14, and was conducted by President Friedlaender. After dinner an illustrated talk was given by H. W. Eastwood on "Electrical Aid to Factory Production," or, more correctly, the "Application of Automatic Control to Machine Tools." A general discussion followed.

Adding Flue Dust to Molten Iron

A patent (1,081,921—December 16, 1913) has been granted to Ralph Baggaley, Pittsburgh, for a method of incorporating blast furnace flue dust in molten iron. It is similar to his patent in connection with copper smelting by which flue dust is mixed with molten matte before sending the latter to the converter. He allows the molten pig iron as it comes from the furnace to fall from four to six feet into a mixing vessel, thus creating a vortex. The flue dust is then discharged continuously at a point within the vortex and so incorporated with the molten iron to a point short of solidification. The resulting product is taken to Bessemer converters, open-hearth or electric furnaces for refining; in fact, only metal to be remelted can be so treated.

The C. O. Bartlett & Snow Company, Cleveland, Ohio, has recently taken the following orders: Mold-ing sand handling and tempering equipment for the Canadian Westinghouse Company, Hamilton, Ontario; paint-making machinery, including mixers and grinders, for the Tropical Oil Company and the Ohio Varnish Company, Cleveland; a universal excavator for the J. D. Owens & Sons Company, Owens, Ohio; eight garbage digesters for the Detroit Reduction Company; two sand and gravel conveying, screening and washing plants for the Greenville Gravel Company, one being for Mechanicsburg, Ohio, and the other for Jackson, Mich.

Six 1500-volt direct-current electric locomotives are being put into commission by the Piedmont & Northern Lines, Charlotte, N. C. They were built by the General Electric Company and weigh 63½ tons with all the weight on the drivers. They are designed for heavy freight service and to develop a tractive effort of 17,500 lb. and a speed of 21 miles per hour. Trains of 800 to 1000 tons gross weight are to be handled. Four motors are used, each geared to an axle. The gear ratio is 65 to 18 and the continuous capacity of each motor is 200 amperes under forced ventilation. Ventilation is supplied by a motor-driven blower and the apparatus is conveniently mounted in the central section of the cab.

Two prizes for the best technical paper in any one year from the junior and student member classes of the American Society of Mechanical Engineers have been provided for by an endowment of \$2000, made by Henry Hess, Philadelphia. The income is to be used for the prizes.

Personal

Cecil A. Robinson, of Wheeling, W. Va., has been elected a director of the La Belle Iron Works, Steubenville, Ohio, to succeed Isaac M. Scott, who resigned some time ago to give his entire attention to the Wheeling Sheet & Tin Plate Company, Yorkville, Ohio, of which he is president.

Mack Gledhill has been elected president of the Galion Brass & Bronze Company, Galion, Ohio, succeeding C. J. Wrath, who has disposed of his interest in the company and resigned.

A. S. Baldwin, after three years' service, has resigned his position as general manager of the Alberger Pump & Condenser Company, Newburgh, N. Y., effective April 1. Under his management the plant has been systematized and the production doubled. Mr. Baldwin's previous connections were as superintendent of the Driggs Seabury Ordnance Corporation, Sharon, Pa., and superintendent for the American & British Mfg. Company, Bridgeport, Conn.

Robert W. Barwood, of Philadelphia, an experienced machine-tool salesman, has been engaged by the Carter & Hakes Machine Company, Winsted, Conn., to act as its representative in the sale of Lincoln and hand milling machines. At present he will confine his efforts to New England and territory adjacent to New York and Philadelphia, with headquarters at The Bourse, Philadelphia.

Noah H. Swayne, 2d, for 15 years connected with Rogers, Brown & Co. in various capacities and for the past eight years manager of the Philadelphia office of that company, tendered his resignation, effective April 1. He has associated himself with Charles W. Mills, of Philadelphia, in a new firm of Swayne & Mills, for the sale of pig iron, coal and coke. Offices will be opened in the Land Title Building, Philadelphia. Mr. Mills for several years was secretary of the Bituminous Coal Operators of Central Pennsylvania, and for the past four or five years has been operating the Climax coal mines at Lockport Station, Pa.

W. E. Hartman, 1201 Webster Building, Chicago, has been retained as consulting engineer for the Lehigh Coke Company, which has just contracted with the H. Koppers Company for 424 by-product coke ovens to be erected at South Bethlehem, Pa.

A. H. Noyes, assistant treasurer of Ayer & Lord Tie Company, who has been seriously ill, is somewhat improved and anticipates a speedy return to his office.

T. L. Ballard, for many years Western manager of the Jones & Lamson Machine Company, with headquarters in Chicago, has retired from business after an active connection with this company dating back to 1897.

William T. Bonner has resigned as president of the Merchant Engineers' Corporation, 30 Church street, New York, to devote his attention to the affairs of William T. Bonner & Co., for many years engaged in the manufacture of Reflex water gauges and other Wilbenco specialties, and to the Timed Impulse Machinery Corporation, of which he is also president. The latter company operates shops at Bush Terminal in South Brooklyn for the manufacture of the Bonner automatic firing timers, impulse circulators for internally fired boilers and other specialties.

J. W. Sheperdson, assistant chief engineer of the Cambria Steel Company, has resigned to accept the position of assistant general superintendent of the Central Iron & Steel Company, Harrisburg.

J. N. Kinney, who for the past seven years has been connected with the American Hoist & Derrick Company, St. Paul, Minn., has resigned his position with that company, having been appointed Eastern sales manager for the Ohio Locomotive Crane Company, Bucyrus, Ohio, with offices located at 30 Church street, New York.

G. W. Alden, who for the past 10 years has been connected with the McMyler Interstate Company, Bedford, Ohio, has resigned his position with that company, having been appointed Western sales manager for the Ohio Locomotive Crane Company, Bucyrus,

Ohio, with offices located in the Fisher Building, Chicago.

W. E. Corey sailed for Europe last week and will be abroad about two months.

S. K. Pierce, assistant treasurer of the Lackawanna Bridge Company, Buffalo, has resigned, effective April 15. He has not yet definitely decided as to his future connection.

Clarence A. Earl, who recently relinquished the post of general manager of the Corbin Screw Corporation, New Britain, Conn., to become second vice-president of the Hendee Mfg. Company, Springfield, Mass., assumed his new duties last week after a brief sojourn at Bermuda.

M. M. Moore, mechanical engineer for the Tool Steel Gear & Pinion Company, Cincinnati, has resigned to accept the position of Western railroad department manager for the U. S. Metal & Mfg. Company, with offices in the McCormick Building, Chicago, assuming his new duties immediately.

D. J. Mullen, recently master mechanic for the Big Four Railroad Company at Mattoon, Ill., has been promoted to the position of superintendent of motive power for the same company, with headquarters at Indianapolis, Ind. He was formerly a resident of Cincinnati, where he obtained his early training in the railroad business.

George Hills has resigned as president of the Welding Materials Company, of New York City, and has been appointed general sales agent of the Siemund Wenzel Electric Welding Company, with headquarters at 30 Church street, New York.

Charles C. Cluff, New York manager of sales for the Carnegie Steel Company, gave an excellent résumé of the development of the modern steel rail and the processes of its manufacture in a recent paper before the Railroad Men's Improvement Society in New York, under the title "Standard Steel T Rails from Ore to Track."

C. P. Perin, consulting engineer for the Tata steel works project in India from its inception, will arrive in New York late in April after a stay of several weeks at the Tata Iron & Steel Company's plant at Sakchi, Bengal. His return is hastened by the death of Mrs. Perin, who accompanied him to India.

Theodore W. Robinson, first vice-president of the Illinois Steel Company, is making a satisfactory recovery from an operation for appendicitis.

C. B. Wilson has resigned as general manager of the Ferro Machine & Foundry Company, Cleveland, Ohio. His place will be taken by Henry Souther, recently elected vice-president of the company. Mr. Wilson expects shortly to take up work along similar lines either in Cleveland or Detroit.

The Terry Steam Turbine Company, Hartford, Conn., announces the appointment of H. A. Rapelye as sales engineer in the Pittsburgh district, with offices at 2123 Oliver Building, Pittsburgh. He has been for the past two years the commercial engineer of a company prominent in the field of prime movers and auxiliaries.

E. F. Platt, formerly connected with the Platt Iron Works, Dayton, Ohio, and C. A. Kurz, Jr., of the Kurz Laboratories, have organized the Electrolytic Gas Company. This company has secured the Western selling agency of the International Oxygen Company of New York and intends to proceed with the installation of a number of electrolytic plants of the I. O. C. system for the production of oxygen and hydrogen in different parts of the country.

J. E. Thropp, Jr., has resigned the position of general manager for Joseph E. Thropp, Everett, Pa., operator of blast furnaces at Everett and Saxton, and conducting extensive coal and coke operations in Bedford and Huntington counties, Pa., and iron-ore mines and quarries in Pennsylvania, Maryland and West Virginia.

Sir Hugh Bell, head of Bell Brothers, Ltd., Middlesbrough, England, arrived in New York March 13, on his way to Washington to visit the British ambassador.

Interviewed on his arrival in New York, he stated that while he was delighted to see the American tariff lowered he did not think that the reduction is going to have any effect on the branches of trade in which he is interested.

James Duane, Jr., who for several years has been in charge of the Hellertown, Pa., furnaces of the Thomas Iron Company, recently resigned to become superintendent of the Carbon Iron & Steel Company's furnace at Parryville, Pa.

H. J. Meehan, superintendent of the Lackawanna Coal & Coke Company at Wehrum, Pa., has been appointed general superintendent of mines for the Cambria Steel Company, succeeding James W. Cook, who resigned January 1.

The Carpenter Steel Company, manufacturer of special steels, Reading, Pa., has appointed James W. Sederquist, 131 State street, Boston, district sales agent for Boston and eastern New England. He will be assisted by William T. Dunn.

M. L. Fechheimer, Fechheimer Steel & Iron Company, Allentown, Pa., who has been seriously ill with pneumonia, is slowly improving.

Frank E. Leavitt, formerly with the United States Radiator Corporation, has been appointed manager of the Shirley Radiator & Foundry Company, Indianapolis, Ind.

A. C. Cook, who for two years has represented the Warner & Swasey Company in Europe, will be appointed general sales manager April 1, with headquarters at Cleveland.

George R. Sullivan, for 14 years connected with the Philadelphia office of Rogers, Brown & Co., has been appointed resident manager at Philadelphia, succeeding on April 1 Noah H. Swayne, 2d, who goes into business on his own account.

Arrangements are under way for the annual meeting of the American Iron, Steel & Heavy Hardware Association, to be held in Cleveland, Ohio, May 26, 27 and 28. The convention headquarters will be at the Hollenden Hotel, where the business sessions will be held. The local committee have arranged a programme for the entertainment of the guests. This will include a dansant at 4 p. m. Tuesday at the Hollenden Hotel, a theater party that evening, a luncheon for the ladies at the Country Club Wednesday, a musical entertainment for the ladies and an open meeting for the men followed by informal dancing Wednesday evening and a banquet Thursday evening. The programme for the business session is being prepared by the officers of the association. Several Cleveland committees have been appointed to make arrangements for the meeting. N. J. Clarke, Upson Nut Company, is general chairman of the various committees and M. E. Ewing, Kirk-Latty Mfg. Company, is secretary.

The Commission on Industrial Relations announces that on April 6 it will begin hearings in Washington, D. C., on collective bargaining, conciliation and arbitration as a means of adjusting differences between employees and employers. The announcement sets forth that "corporation officials and trades-union leaders who have negotiated and maintained trade agreements in five of the largest industries will be called to testify, and the commission hopes to elicit information that will disclose to what extent improvement in industrial relations might be expected from the general adoption of such agreements."

The Van Dorn & Dutton Company, manufacturer of gears, electrically driven portable tools and electrical specialties, Cleveland, Ohio, has opened a district sales office at 50 Church street, New York, which is in charge of M. P. Fillingham, as district sales manager. This office has been opened for the purpose of serving the company's increasing patronage in the East to better advantage.

Obituary

CHARLES A. MORRIS, whose death occurred March 8 at Los Gatos, Cal., where he had gone in December for his health, was identified as an engineer principally with dredging interests, and was considered an authority in this branch, also in conveyors for handling coal, freight and other heavy commodities. He was a grandson of Ephraim Morris, the originator and inventor of the clam shell bucket and other devices and was a son of Augustus T. Morris, of the Morris & Cumings Dredging Company, so came naturally by his ability in his special line. At the time of his death Mr. Morris was employed as consulting engineer by the Hayward Company, 50 Church street, New York, his principal duties being the development and improvement of buckets and solving engineering problems. As a young man, he left Stevens Institute to take a position with the Morris & Cumings Dredging Company in an engineering capacity. Brought in contact with John P. Holland, inventor of the submarine, he worked with Mr. Holland in making the boat practical and interesting capitalists in the company which sold the first boat to the United States Government. He was for a time connected with the Munson Steamship Company, solving many of its problems of handling freight at Cuban and other ports, by the use of his patented coal-handling bucket and chute and his conveyor beam.

ROBERT COLLINS MOODEY, who for years was very prominent in the wire industry, died at his home in Painesville, Ohio, March 15, aged 56 years. He was stricken with apoplexy during the night and expired almost immediately. He was born in Painesville and received his early business training with the Cleveland Rolling Mill Company with which he was associated about 30 years, or until that company was taken over by the American Steel & Wire Company. For a long time he was general sales manager of the wire mill products of the former company. At the time of his death he was president of the Cleveland Wire Spring Company, president of the Cleveland Machine & Mfg. Company, Cleveland, Ohio, president of the Coe Mfg. Company, Painesville, and treasurer of the Cleveland & Buffalo Transit Company. He leaves a widow, one daughter and one son, the latter Robert R. Moodey, of the Cleveland Machine & Mfg. Company.

JOHN CRAIG HARVEY, for many years secretary and treasurer of Charles L. Bailey & Co., Inc., Harrisburg, Pa., died March 13, aged 70 years. He was a native of Philadelphia and served in the civil war, being an assistant adjutant general at its close. He was connected with the Bailey interests from a period shortly after the war, being identified chiefly with the Chesapeake Nail Works.

ROGER TIFFT HOLLOWAY died at his home in Montclair, N. J., March 12, aged 28 years. Graduating from Cornell University as a civil engineer in 1908, he engaged in steel construction work in New York, his first connection being with Charles A. Mead in the firm of Mead & Holloway. In the past two years Mr. Holloway had also represented Bagley, Mills & Co., London, agents of the Carl Still by-product coke oven and benzol recovery system. He was a son of H. F. Holloway, New York representative of the Jones & Laughlin Steel Company.

The Cleveland Pressed Steel Company, Cleveland, Ohio, recently organized to take over the business of the Thatcher-Rueter Mfg. Company, has elected Joseph Schulte, president; H. F. Rueter, vice-president and general manager, and John H. Schulte, secretary and treasurer.

The Ferro Machine & Foundry Company, Cleveland, Ohio, manufacturer of gray-iron castings, has established a branch office at 2117 Dime Bank Building, Detroit, Mich. J. J. Ramsey, formerly secretary of the E. R. Thomas Motor Car Company, will have charge of the new office.

A Four-Cylinder Triple-Expansion Engine

A high-speed engine of the triple-expansion type with four cylinders has been developed by the American Engine & Electric Company, Bound Brook, N. J., for driving centrifugal pumps. The engine is of the double-angle type, the high-pressure and intermediate cylinders being located in the horizontal plane while the two low-pressure cylinders are vertical. The advantage claimed for this construction is that it gives a large ratio of expansion and eliminates a large low-pressure cylinder with heavy reciprocating parts. It is pointed out that with a single large low-pressure cylinder, the speed would have to be materially reduced, and the size, weight and space required by the engine increased. This increase would necessitate a decrease in the speed, and if the engine is to be operated at the high speeds usually desired for driving pumps, the size of the low-pressure cylinder must be reduced with a corresponding reduction in the expansion ratio and economy.

Higher speeds, it is emphasized, may be used with the four-cylinder construction, on account of the smaller size of the two low-pressure pistons and rods, and because the inertia forces of the vertical reciprocating masses are opposed and balanced by equal and opposite ones from the horizontal cylinder. Vibration and pounding are eliminated, so that the foundations required are light and inexpensive. For example, a 1000-hp. engine of this type, it is explained, would require about 25 cu. yd. of concrete for its foundation, while a compound Corliss engine of equal power would require five times as much.

The general design of the engine is similar to that of the company's angle compound type. One of the special features of the engine is the lubricating system, all parts being supplied with oil from two central storage tanks, located between the low-pressure cylinders. The oil collects by gravity in the cylinders and is then returned to the elevated tanks by two pumps operated by the valve gear rocker arms of the horizontal cylinders. The governor is of the builder's standard inertia type, and its principal function is to prevent runaway in case the load is seriously reduced by the clogging of the pump inlet.

January Iron and Steel Exports and Imports

The January report of the Bureau of Foreign and Domestic Commerce shows a marked decrease in the value of both the iron and steel exports and imports as compared with the preceding month and with the corresponding month of 1913. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in January was \$16,706,836, against \$22,616,701 in December, 1913, \$20,142,141 in November and \$25,141,409 in January. Import values for January were \$2,334,895, as compared with \$2,814,774 in December, 1913, \$2,495,093 in November and \$2,860,510 in January.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for the seven months ended with January was \$155,608,146, against \$174,224,356 for the corresponding portion of the previous fiscal year. The value of the imports of iron and steel and manufactures thereof, excluding iron ore, for the same period was \$18,144,676, as compared with \$18,705,427 for the same part of the previous fiscal year. Both, however, are larger than for the same portion of 1911-1912, the figures for those seven months being \$137,442,207 and \$15,471,677 respectively.

The exports of commodities for which quantities are given totaled 118,768 gross tons in January, as compared with 195,723 tons in December, 1913, 175,514 tons in November and 249,489 tons in January. The falling off in the exports was general, but the most noteworthy decline was in wire rods which decreased from 8985 tons in January, 1913, to 7451 tons in December and 869 tons in January, 1914. All other iron sheets and plates declined from 3244 tons in January, 1913, to 381 tons in the same month of the present year. Bolts and nuts, horseshoes and barbed wire were

about the same, the exports of horseshoes being only 3 tons less in 1914 than in the previous year.

Details of the exports of tonnage commodities in January and the seven months ended with January, compared with the corresponding periods of the previous fiscal year are as follows:

Exports of Iron and Steel.

	January 1914	1913	January 1914	Seven Months 1914
	Gross tons	Gross tons	Gross tons	Gross tons
Pig iron	12,852	26,128	143,837	166,487
Scrap	6,160	11,208	51,591	61,411
Bar iron	371	2,009	8,464	16,445
Wire rods	869	8,985	18,882	17,427
Steel bars	9,511	18,176	99,042	140,475
Billets, Ingots and blooms	2,864	18,056	22,846	176,919
Bolts and nuts	1,631	1,783	12,721	11,770
Hoops and bands	1,015	2,039	7,593	10,089
Horseshoes	107	110	706	620
Cut nails	185	355	2,233	3,419
Railroad spikes	270	1,053	5,024	7,861
Wire nails	2,831	4,009	22,943	35,910
All other nails, includ- ing tacks	204	363	1,996	2,394
Pipes and pipe fittings	16,684	24,433	152,932	141,121
Radulators and cast-iron house heating boilers	559	739	4,190	4,921
Steel rails	17,620	35,695	246,548	256,615
Galvanized-iron sheets and plates	2,443	9,703	34,515	79,215
All other iron sheets, and plates	381	3,244	7,329	20,455
Steel plates	7,567	19,640	103,699	155,241
Steel sheets	6,560	9,283	80,755	75,763
Structural iron and steel	15,610	30,654	220,964	186,398
Tin and terne plates	2,351	4,775	24,285	41,067
Barbed wire	5,893	5,456	49,848	54,888
All other wire	4,230	11,593	48,374	85,299
Totals	118,768	249,489	1,371,287	1,751,310

In January the imports of commodities for which quantities are given totaled 17,837 gross tons, against 26,452 tons in December, 1913, 25,810 tons in November and 18,357 tons in January. The principal changes were an increase in steel rails from 166 tons a year ago to 1224 tons and in tin and terne plates from 249 tons to 3689 tons, and a decrease in structural shapes from 1430 tons to 709 tons. The imports of steel billets without alloys declined from 542 tons in December, 1913, to only 1200 lb. in January. Details of the imports of these commodities in January and the seven months ended with January, as compared with the corresponding periods of the previous fiscal year are as follows:

Imports of Iron and Steel.

	January 1914	1913	January 1914	Seven Months 1914
	Gross tons	Gross tons	Gross tons	Gross tons
Pig iron (including ferro- silicon)			11,633	*38,892
Ferrosilicon	399	...	11,299	...
All other pig iron	3,602	...	*38,525	...
Scrap	1,285	...	19,768	18,877
Bar iron	2,212	1,528	15,259	16,501
Structural iron and steel billet	709	1,430	6,216	3,284
Ingots, blooms and steel			1,883	*6,317
Steel billets without alloys	1	...	+2,174	...
All other steel billets	3,399	...	*10,136	...
Steel rails	1,224	166	8,697	2,255
Sheets and plates	155	225	1,312	2,213
Tin and terne plates	3,689	249	12,781	1,314
Wire rods	1,162	1,243	7,924	9,051
Totals	17,837	18,357	169,300	149,881

*Figures cover period from January 1 to October 3, inclusive.

[†]Figures cover period since October 3, 1913.

The imports of iron ore in January were 101,804 gross tons, against 223,933 tons in December, 1913, 179,727 tons in November and 175,463 tons in January.

Germany's Exports in January

Germany's exports of iron and steel in January amounted to 499,627 metric tons, which is a reduction of only 286 tons from the figures for January, 1912. A few details are given below:

Metric tons	1913	1914
Pig iron	83,952	55,902
Semi-finished steel	56,888	55,647
Beams	35,928	23,109
Bars and other shaped products	79,940	104,343
Plates	32,076	38,411
Sheets	12,012	16,208
Wire, not polished	23,168	21,121
Wire, polished	15,797	14,408
Wire nails	4,807	5,790
Tubing	16,672	11,174
Rails	26,468	32,577

Western Branch, National Metal Trades

In a talk largely devoted to a severe arraignment and condemnation of many so-called efficiency experts and their methods, Lucien I. Yeomans addressed the annual meeting of the Western Branch of the National Metal Trades Association on the subject "Efficiency—Real and Apparent." The meeting was held March 10 in Chicago. In the opinion of Mr. Yeomans, the cause of efficiency and its benefits are being seriously injured by what is equivalent to mal-practice. The regular annual reports were submitted by the officers and papers were presented by C. E. Hoyt, of the Lewis Institute, covering the associations "Co-operative Course for Shop Apprentices"; by Edgar J. Delafield, Southern Insurance Company, on "Insurance" and by William H. Doolittle, safety inspector of the National Association, on "The Development of the Safety First Campaign." About 125 members were in attendance and the election of officers resulted as follows: President, A. T. Whiting, Whiting Foundry Equipment Company; vice-president, L. C. Walker, Aeromotor Company; treasurer, O. A. Olson, Simonds Mfg. Company; secretary, Paul Blatchford. Executive committee—A. T. Whiting, L. C. Walker and O. A. Olson; W. L. Kroeschell, Kroeschell Brothers Company; F. S. North, Union Special Machine Company; Staunton B. Peck, Link-Belt Company; Carlton L. Elmes, Elmes Engineering Works; Gustave A. Roth, Roth Bros. Company; Wm. Ganschow, Wm. Ganschow Company.

Rhode Island Branch, National Metal Trades

The annual meeting of the Rhode Island Branch, National Metal Trades Association, was held in Providence, March 12, with a large and representative attendance. At the business meeting J. E. Osgood, J. E. Carpenter Tap & Die Company, Pawtucket, was elected president; A. J. Thornley, Narragansett Machine Company, Pawtucket, vice-president; Henry Sharpe Chaffee, Builders Iron Foundry, Providence, treasurer; Joseph A. Holland, secretary; executive committee, the first three officers, and Paul De Wolf, Brown & Sharpe Mfg. Company, Providence; W. T. Murphy, Standard Machinery Company, Auburn; Edwin C. Smith, Mossberg Wrench Company, Central Falls, and Howard N. Easton, Easton & Burnham Machine Company, Pawtucket. At the banquet President Osgood was the toastmaster, and the speakers were Henry A. Carpenter, General Fire Extinguisher Company, Providence; M. H. Barker, American Tool & Machine Company, Boston, honorary member of the executive council of the National Metal Trades Association, and Col. Lewis T. Bryant, commissioner of labor of New Jersey, who took for his topic the national fire losses in life and property.

The Port Henry, N. Y., furnace of the Northern Iron Company, now operated under lease by the MacIntyre Iron Company, has been banked and will be inactive for a few weeks. Meanwhile a stock of titaniferous iron ore will be accumulated, shipments being made from the Lake Sanford mine to Mineville for concentration by Witherbee, Sherman & Co. and thence to Port Henry.

The Kenosha Boiler & Structural Iron Company, Kenosha, Wis., has installed new equipment and arranged its works for specializing in steel construction and structural shapes for building and other purposes. The steel tank, stack and boiler department will be continued as before and the output increased as the demand grows.

O. O. Vrooman has been appointed receiver of the J. D. Smith Foundry Supply Company, Cleveland, Ohio, as a result of bankruptcy proceedings instituted in the Federal Court. The prolonged unsatisfactory business conditions are given as the cause of the proceedings.

The Baldwin Locomotive Works, at its two plants in Philadelphia and Eddystone, Pa., has on its payroll now about 8000 men, as compared with over twice as many last June, when work was at the highest peak in several years.

Waste Material Dealers' Association

The first annual banquet of the National Association of Waste Material Dealers was held at the Hotel Astor, New York City, on Tuesday evening, March 17. The gathering was representative, large dealers in waste material being present from numerous cities.

Theodore Hofeller, the retiring first president of the association, was toastmaster. In his extremely interesting remarks, he estimated the total annual business of the country in waste material at \$700,000,000. Curtis Guild, former Governor of Massachusetts, former Ambassador to Russia, and principal owner of the Boston Commercial Bulletin, was the principal speaker. Mr. Guild made a scholarly address on "The Usefulness of the Unused." It was a remarkably thorough presentation of the development of conservation in applying discarded materials to new uses. The Commercial Bulletin was the pioneer in giving market reports on waste materials, having begun to do so over 50 years ago. The new president, Louis Brikenstein, also spoke most effectively.

The association was organized in Boston a year ago, and embraces in its membership dealers in all classes of waste material. Its annual meeting was held in the Hotel Astor on Tuesday afternoon, at which the following officers were elected: President, Louis Brikenstein; vice-presidents, Simon Weil, C. B. White, Edward Stone, H. H. Cummings and William Buxton. Charles Frankel, Maurice Frankel, Ross B. Linton, Louis Lahn and Paul Lowenthal were re-elected as directors and Theodore Hofeller was also made a director. Mark Sherwin was re-elected treasurer and Charles M. Haskins, Boston Commercial Bulletin, secretary.

Sheet Metal Contractors' Convention

The Cincinnati Sheet Metal Club, organized for the purpose of entertaining the National Association of Sheet Metal Contractors, held its third meeting on the evening of March 12, at the Business Men's Club, E. W. Edwards, presiding. Definite arrangements were made with the Cincinnati Music Hall where the exhibits will be shown. Additional officers were elected and committees appointed. The following are the officers of the club: President, E. W. Edwards; first vice-president, William T. Stechow; second vice-president, Albert Boebinger; secretary, F. F. Verges; assistant secretary, C. L. Smith; treasurer, Charles E. Pfau. The chairmen of the different committees are as follows: Hall & Exhibits, Charles Kobman; Finance, Charles E. Pfau; Press, G. E. Meyers; Hotel and Headquarters, O. S. Larkby; Entertainment, C. H. Fitzwilson; Banquet, John Peck; Membership, E. J. Becker. As other conventions will be held in Cincinnati in the second week in June, permission was obtained from the sheet metal contractors to postpone their annual convention one week, making the dates June 16 to 19 inclusive.

Worcester Branch, National Metal Trades

The annual meeting of the Worcester Branch, National Metal Trades Association, was held March 10. Officers were elected as follows: President, John W. Higgins, Worcester Pressed Steel Company; vice-president, Paul B. Morgan, Morgan Construction Company; treasurer, A. W. Beaman, Stockbridge Machine Company; executive board, George I. Alden, Norton Company and Norton Grinding Company; Albert E. Newton, Reed-Prentice Company; George H. Coates, Coates Clipper Company; Edwin C. Harrington, Harrington & Richardson Arms Company; W. H. Gates, Baldwin Chain & Mfg. Company, and F. F. Cutting, Lapointe Machine Tool Company, Hudson, Mass. The report of Treasurer Beaman showed a prosperous financial year, and that of Secretary Donald Tulloch revealed the fact that the labor bureau conducted by the branch showed an increase in applications for work and a decrease in requisitions for men by employers.

The hearings in the suit of the Government for the dissolution of the United States Steel Corporation, which were to have been resumed in New York City March 17, have been postponed for a week.

The Continental Supply Company

The Continental Supply Company, a subsidiary of the Youngstown Sheet & Tube Company, Youngstown, Ohio, reports gross sales in 1913 of more than \$5,000,000. It has its main offices in St. Louis and deals exclusively in oil-well supplies. At the second annual meeting of the company, held recently in Youngstown, directors were re-elected as follows: Richard Garlick, George E. Day, C. S. Robinson, L. J. Campbell, W. E. Manning, James A. Campbell, Walter H. Adams, W. K. Hughes and W. R. Wilkinson. The last three are located in St. Louis. The officers are: James A. Campbell, chairman; William E. Manning, president; Walter H. Adams, vice-president and treasurer; W. K. Hughes, vice-president and sales manager; W. R. Wilkinson, secretary. The 22 district offices and stores of the Continental Supply Company are scattered from Pennsylvania to Texas and Wyoming. Boilers, engines, rope cables, pipe and oil-well casing are the chief articles handled. Pipe and casing are manufactured by the Youngstown Sheet & Tube Company, while the other articles are handled for the purpose of completing a full line of oil-well supply materials.

Otis Elevator Company

The report of the Otis Elevator Company for the year ended December 31, 1913, shows net earnings of \$1,157,395, after deducting all charges for interest and patent expenses and for renewals and repairs for maintenance of plant, as compared with \$1,282,195 in 1912.

President W. D. Baldwin, in his remarks to the stockholders, says: "The decline in building operations which prevailed throughout the country during 1913, especially the latter part of the year, naturally resulted in a falling off in the demand for the company's products, the result being that the volume of business for 1913 is about 15 per cent. below the high water mark of 1912."

A pipe wrench with wooden side pieces or scales on the handle has been brought out by The H. D. Smith & Co., Plantsville, Conn. It represents a further development of the use of what the Smith Company calls the Perfect handle, which has already been applied to a considerable number of tools, including wrenches of other kinds, hammers, screw drivers and the like. By the use of the wooden pieces, the strength of the continuous bar of metal is availed of, with the addition that a swell to the handle is obtained with advantage in manipulation, in that it minimizes the danger of one's losing his hold on the wrench, besides making the wrench comfortable to handle in either hot or cold weather. A leaflet illustrating the wrench, which is ordinarily made in four sizes to grip rounds from $\frac{1}{8}$ to 2 in. in diameter, has been prepared for general distribution.

An insight into the depreciation of prime movers is obtained in the case of a \$225,000 power unit recently demolished in New York City. This machine had done good service for a period of 12 yr. 3 mo., but it had become obsolete in comparison with later available apparatus showing higher economy. The interesting further fact is that the machine has a scrap value of \$5000 and very little else, as it is figured that any institution capable of utilizing a machine of its capacity would, including of course the difference in the economy of operation, find that a modern prime mover costs no more than the old machine transported and erected, although supplied at practically no first cost.

Reports that the Youngstown Sheet & Tube Company, Youngstown, Ohio, has definitely decided to build a large by-product coke plant at East Youngstown to supply coke for its four blast furnaces there are untrue. This company has had under consideration the matter of building by-product coke ovens, and while this will be done at some time in the future no definite decision has been reached, nor has the type of oven to be built been decided upon. Furnace B of this company blew in on Tuesday, March 17 and its four stacks are now in operation, making close to 2000 tons of Bessemer iron per day.

Corrosion of Alloy Steels

The corrosion of nickel, chromium and nickel-chromium steels is reported on by J. N. Friend, J. L. Bently, and Walter West in *Engineering*, London, xciii, 753. Disks were prepared of carbon steels to serve as standards, also disks of the alloy steels, each 0.7 cm. thick and 2.8 cm. in diameter. These were kept nearly immersed in faucet water for 64 days, in sea water for 69 days, in 0.5 per cent. H_2SO_4 for 60 and 53 days; they were also exposed to alternate wet and dry tests for 52 days. In some cases there were indications of galvanic action in the chromium and nickel steels in the acid tests, but no chromium or nickel passed into solution, showing that these elements were the constituents of the cathode. The resistance of chromium steels to corrosion in salt water suggests the use of this metal for shipbuilding. Nickel steels show marked resistance both to acid and neutral corrosive solutions, the resistance increasing with increased nickel content.

Russia's Shortage of Pig Iron

Because the Russian blast furnace companies which are in the association known as the Prodmet cannot produce sufficient pig iron to satisfy the growing needs of the iron and steel consuming industries and because importation is prohibited, the question of supplying the need became so acute early this year that a special conference took up the question. It was summoned by the Russian Minister of Commerce and included the pig iron producers, the railroad representatives and various industrial experts. It was shown that the Russian output of pig iron for 1914 would not exceed 4,000,000 tons, about 450,000 tons greater than in 1913, while 5,000,000 tons would be needed. It was decided to allow the importation, duty free, for one year of a quantity of pig iron, tires and axles to be fixed by an expert appointed by the government.

High-Speed Steel Scrap

The growing use of high-speed steel is having its effect on the disposition of tool scrap. The amount of scrap is larger in proportion to the first cost than might be supposed. A large railroad shop which has kept close account of this finds it to be about 40 per cent. of the original amount purchased. The practice of this road is to have the scrap sorted and classified as to grade. When a sufficient quantity has accumulated it goes to the blacksmith shop and is worked over under a 1200-lb. hammer by an experienced worker. In this way something over 80 per cent. of the scrap is successfully reclaimed at a cost of about 5c. per lb. This subject has not received as much attention in the machine-building field as the investment warrants.

M. A. Hanna & Co., Cleveland, have issued a handsome leather covered ore book for 1914. Three new ores are listed, including the Andrews and Duane ores from the Wakefield mine in the Gogebic range. The former runs 59.50 per cent. iron dried at 212 degrees and 52.91 per cent. iron natural, and the latter 58.20 per cent. iron dried and 51.71 per cent. iron natural. The third is the Carpenter ore from the Carpenter mine of the Hollister Mining Company in the Iron River district. This runs 57 per cent. in iron dried and 51.16 per cent. iron natural.

Bids have been asked by the Spanish government for the establishment in that country of works for the manufacture of projectiles for the use of the Spanish navy, according to the *Revista Minera*. Three offers are understood to have been received, one from an important Swedish company, another from an Italian company and a third from T. Firth & Sons, Ltd., Sheffield, England.

Corrigan, McKinney & Co., Cleveland, Ohio, have issued their 1914 ore analysis book. One new ore is listed, the Richards, a brown hematite non-Bessemer ore from the Menominee range. This is a high-grade foundry ore, being high in phosphorus. Its iron analysis, dried at 212 deg., shows 57.20 per cent. iron and 0.58 per cent. phosphorus.

The Machinery Markets

Quiet continues to be the conspicuous feature of the principal machinery markets. This is especially true of machine tool manufacturers, there being a better degree of activity in some other lines of the metal trades. New York is dull, but hears that favorable action in shop equipment buying may be taken by two or three railroads in the near future. The reluctance of the railroads to buy is severely felt all over the country. The New England trade is not cheerful inasmuch as the January improvement has subsided and substantial betterment is believed to be dependent on a resumption of railroad demand. In Cleveland the machine tool trade and the foundries are dull. Inquiries are slightly better in Cincinnati and the foundries are busier, but purchasing is developing very slowly. The Detroit market has been uneventful, although there has been a fair demand for special equipment and general manufacturing conditions are satisfactory. Some good prospects in Chicago are hanging fire and inquiries and buying alike are perfunctory. New construction is being hastened under favorable weather conditions in Milwaukee and the trade takes a more cheerful view of the situation. In the Central South a slight depression is felt. In St. Louis there has been a little improvement, although capital is still conservative. The recovery from recent dullness in Birmingham is slow, although the near future promises greater activity despite the tendency of the railroads to hold off in buying. The best call in Texas is for cotton gin and irrigating machinery and while conditions are still noticeably below normal they are growing better. The Pacific Northwest is threatened with labor trouble in the lumber district which, if not averted, will interfere with the machinery demand of that section. In some districts similar troubles have been avoided, and the mills are running to full capacity. The demand is somewhat improved in this territory, but collections are not easy.

New York

NEW YORK, March 18, 1914.

Local business is far from being large and in general there is very little change to report in conditions. Salesmen in touch with the railroads have found a slightly better sentiment on the part of a few purchasing departments despite what seems to be the tangle in which the freight rate advance question is involved. They expect that at least two other railroads beside the Seaboard Air Line will be in the market in the not far distant future. One of these roads is near New York, but until it has become more of a tangible prospect its name cannot be mentioned. In the course of the week orders have been practically placed for a number of large turret lathes by a company in Long Island City manufacturing wire wheels for automobiles. Within a few days orders for additional machines of the same kind are to be placed. This is the best piece of current business in the market which otherwise continues dull. For second-hand machinery there is but an indifferent demand. Some representatives of machine tool houses with whom February was fairly good have not made a sale this month.

The J. W. Clement Company, 80 Exchange street, Buffalo, is having plans completed for a printing plant, 135 x 370 ft., one story and basement, steel and concrete, which it will erect at an estimated cost of \$100,000.

Plans will soon be ready for bids for a reinforced concrete feed mill to be built at Elk and Prenatt streets and the Nickel Plate Railroad by the Consolidated Milling Company, 827 Chamber of Commerce Building, Buffalo, at an estimated cost of \$200,000.

Ward & Ward, Inc., Buffalo, has had plans prepared for a five-story and basement bakery which it will erect at an approximate cost of \$300,000 for building and equipment.

The Taylor Ice Cream Company, Niagara Falls, N. Y., is receiving bids through its architect, Louis P. J. Eckel, 191 York street, Buffalo, for a two-story factory.

The Peoples Gas & Electric Company, Oswego, N. Y., is completing arrangements to increase its capital stock from \$600,000 to \$1,000,000, to provide funds for extensive improvements to its plant. The gas plant will be rebuilt and equipped complete.

The George J. Michelson Furniture Company, Rochester, N. Y., is taking bids for a factory addition 112 x 142 ft., three stories.

The New Process Gear Corporation, Syracuse, N. Y., has placed orders for most of the machinery equipment required for the new three-story, 40 x 100 ft., concrete and steel addition to its factory, including

14 Potter & Johnson automatic turret lathes, 17 Gleason bevel gear generators, six Gould & Eberhardt bevel gear blocking machines and two Fellows spiral gear shaping machines.

The Gifford-Wood Company, Hudson, N. Y., has let contract for an addition to its plant, 75 x 150 ft., one-story.

An issue of bonds for \$50,000, has been authorized by the taxpayers of Bath, N. Y., to provide for construction of a municipal lighting plant.

C. F. Schupp & Son, 117 Fourth street, Albany, are taking bids for a bakery and refrigerator building 88½ x 110 ft., three-stories and basement, of brick and steel construction.

The Partridge, Clark & Kerrigan Company, Albany, has been incorporated with a capital stock of \$100,000, to engage in the manufacture of motor cars, for which a factory will be equipped. E. S. Partridge, B. A. Wordeman and S. J. Wagstaff are the directors.

The D. H. Stoll Company, Inc., Buffalo, manufacturer of presses, shears, dies and other sheet metal working machinery, has arranged for a three-story addition to its present manufacturing facilities. The new building will be 40 x 118 ft., of brick and steel construction.

The board of public works, Fulton, N. Y., will receive bids for an electric lighting system, based both on multiple and on series system.

Final plans for the sewage disposal system for Rochester, N. Y., are about completed.

The American Ever Ready Works, a subsidiary of the National Carbon Company, Cleveland, will shortly begin the erection of a plant at Long Island City, Long Island, for the manufacture of flash lights, dry batteries and novelties. It will be 200 x 300 ft., eight stories, of reinforced concrete and fire proof construction. The site has a frontage on Thompson and Nott avenues and Orton street, where good facilities for shipping by rail and water will be available. On its completion the present plant of the American Ever Ready Works, New York City, will be removed there.

The Rock Plaster Mfg. Company has awarded the contract for erecting three large reinforced concrete factory buildings at the foot of 150th street and East River, Bronx, New York City. These are one mill, 80 x 102 ft., four stories; one mill, 27 x 50 ft., one story, and one factory and pumping station, 52 x 80 ft., one story. The Turner Construction Company, 11 Broadway, is the general contractor.

The Magee Valve Company, 105 Beekman street, New York City, has been incorporated to manufacture valves, thermometers, water gauges, etc., and to do a general jobbing business. F. H. Tweed is president and treasurer, D. H. Schubert, secretary.

Bids will be received until March 24 by Arthur Starr, city clerk, Woodbury, N. J., for the construction of a water supply system.

The Thompson Machine & Mfg. Company, Ardmore, Pa., recently incorporated, will manufacture compressed air appliances, engines, machinery, mechanical and electrical apparatus, etc. At the start it will specialize in compressed air gear shift and clutch and brake control for automobiles. Plans for location of the factory and its equipment are incomplete. W. G. Wagner is secretary.

It is reported that the Burgomaster, Antwerp, Belgium, will receive bids until April 6, for high pressure pumps.

The bondholders bid in at sheriff's sale on March 7 the iron foundry and steel foundry recently operated by Rowland Firth & Son Company at Phillipsburg, N. J. The bondholders now seek to dispose of the plant to a company that will operate it.

New England

BOSTON, MASS., March 17, 1914.

The machinery trade is by no means cheerful. A few large orders have had a local effect in keeping works busy, and foreign business has helped out to some extent; but the little spurt which came soon after the beginning of the year has not been maintained. While the users of machinery are busier than they were, the machinery people are convinced that until the railroads begin buying on a normal scale conditions will not be good with them. Announcements of enlargements of works are more numerous than they have been. Everyone is waiting somewhat anxiously to see how the normally high months of April and May will develop.

The railroads of New England will not be large buyers this year. The Boston & Albany division of the New York Central may be in the market for equipment, though no announcement to that effect has been made. The Grand Trunk has resumed the building of the southern New England line, from Palmer, Mass., to Providence, R. I., which may mean the purchase of a considerable amount of supplies, but the time for the increase in repair shop facilities to take care of the greater burden which this new road will place upon the Grand Trunk shops, represented by the Vermont Central's stations, will not arrive in 1914. The New York, New Haven & Hartford Railroad and its allied system, the Boston & Maine, have started a policy of deep retrenchment. Trains are being taken off, and word comes from Readville, Mass., that the working force of the great repair shops there has been materially reduced, at least until after April 1.

The Portsmouth Navy Yard, Portsmouth, N. H., will build one of the submarines recently authorized by Congress, the work to be done under the supervision of the Lake Torpedo Boat Company, Bridgeport, Conn. This is the first work of the kind which the Portsmouth yard has undertaken.

The Putnam Machine Company, Fitchburg, Mass., the ownership of which recently passed to Manning, Maxwell & Moore, New York, is planning the erection of a large machine shop and a large foundry, the plans for which are now being prepared. It is probable that building will begin within 60 days. Modern equipment will, of course, be installed.

The new plant of the Holtzer-Cabot Company, Brookline, Mass., manufacturer of electrical equipment and specialties, will be located on a tract of land recently purchased on Amory street, near Eggleston square, Roxbury, an outskirt of Boston. For some years the company has been planning the erection of a modern factory, but the project was somewhat interfered with by the fire which partially destroyed the works at Brookline. The new works will consist of a building 60 x 300 ft., six stories, with an ell 60 x 100 ft., of the same height, and a power house and a brass foundry. The buildings will be of concrete.

The Skinner Chuck Company, New Britain, Conn., manufacturer of lathe, drilling machine and planer chucks, expects to go ahead immediately with the erection of the addition to its works, allusion to which has

already been made. The building will be 50 x 154 ft., four stories and will more than double the floor space of the factory. The company states that it has not decided upon the new equipment and consequently not even a tentative list is available. The details will be worked out later. The building will be of mill construction, with heavy timbers, the floor to support 250 lb. to the sq. ft. The office will be on the top floor, and will be lighted by large windows on the sides and a sawtooth roof with skylights. Material changes will be made in the system of moving work through the factory. The whole purpose is to give a higher efficiency in every department, as well as to secure a better quality of product.

The Sprague Meter Company, Bridgeport, Conn., has purchased a tract of land in the neighboring town of Stratford, and will erect a new plant on the site in the near future.

A building which will be added to the Dover Machine Works plant of the National Woodworking Machinery Company, Dover, N. H., will be for storage purposes only and no equipment will be purchased.

The factory of the Noiseless Typewriter Company, Middletown, Conn., will be sold by the receiver April 7.

The additional two stories which the Union Mfg. Company, New Britain, Conn., will add to one of its buildings will be used for the present for office and storage purposes.

The works of the National Company, Waterbury, Conn., which will manufacture brass tubing, should be ready for occupancy sometime in May, according to present expectation. The plant will be driven by electric power, and the company will be in the market for some electrical equipment in the near future. The machinery has been purchased. The Waterbury-Farrel Foundry & Machine Company is furnishing the draw benches and swaging machines, and the Torrington Company the straightening machinery.

Additions to general manufacturing facilities of New England include a three-story building, 45 x 199 ft., for the Colored Worsted Company, Providence, R. I.; a factory at North Attleboro, Mass., for the Parker-Simmons Company, for the manufacture of novelties; a building 60 x 236 ft., nine stories, to cost \$100,000 as an addition to the Lyman Mills, Springfield, Mass.; an addition to the White & Corbin division, United States Envelope Company, at Rockville, Conn., 50 x 130 ft., two stories; Prentice Mfg. Company, New Britain, Conn., factory 40 x 100 ft., mill construction.

The new factory of the Bennington Scale Company, Bennington, Vt., is about completed, and the equipment has been purchased. The company manufactures a wide line of scales and balances.

The Rockwell Silver Company, New Britain, Conn., Meriden, Conn., states that the purpose of the increase in capital stock from \$20,000 to \$30,000 is to secure capital for the enlargement of the business, and chiefly for the purchase of additional equipment.

The new factory which will be added to the works of the French Mfg. Company, Waterbury, Conn., manufacturer of brass tubing, will be 80 x 112 ft.

The new boiler works which Spiers Bros., New London, Conn., is erecting will be 46 x 80 ft. The company will purchase a bolt cutter, tube and pipe cutter, a grinding machine, and electric fans for the fires. The rest of the equipment will be moved from the present plant.

The water commissioners, Beverly, Mass., have advertised for bids for furnishing a pumping station and workshop at an estimated cost of \$6500.

Chicago

CHICAGO, ILL., March 16, 1914.

The actual purchase of equipment for the Pullman School, of which mention was made recently, will probably not materialize for perhaps a year. Plans are yet in the preliminary state. The inquiry for the Calumet plant of the Baldwin Locomotive Works is still quiescent. Among the more important business for which there is an immediate prospect of closing is the equipment to be bought by the Louisville & Nashville Railroad for its car building shop. The tools to be

purchased are estimated at an aggregate value of about \$60,000. Among local machinery dealers particular interest centers in the tools for sawing and fabricating structural steel. In the general industrial trade, inquiry and buying are largely perfunctory.

C. H. Simmons, 139 North Clark street, Chicago, manufacturer of valves, has organized the Simmons Vapor Vacuum Company with a capital of \$2000, to specialize in valves for heating systems.

Barber & Co., Chicago, has been incorporated with a capital of \$2500 to engage in the manufacture and sale of conveying and power transmission machinery. The incorporators are Sherman Barber, 2812 Wabash avenue; David C. Everitt and R. M. Burnett.

The Chicago Stoker Company, organized in the office of Harry J. Lurie, attorney, 69 West Washington street, Chicago, with a capital of \$15,000, will manufacture stokers and coal handling machinery.

The Electrical Engineers' Equipment Company, 10 North Desplaines street, Chicago, has acquired the property, 60 x 92 ft., with factory improvement on Meridian street, near Union.

The Woods Mobilette Company, Chicago, whose incorporation was recently mentioned, has purchased a plant at Harvey, Ill., and will proceed at once to put the plant equipment in shape for manufacturing operations.

The Addressograph Company, 901 West Van Buren street, Chicago, has plans maturing for the erection of a factory, 100 x 125 ft., six stories, for the manufacture of addressing machines. The new plant will cost in the neighborhood of \$125,000.

The Standard Cycle Car Company, Chicago, through its attorney, Otto G. Knecht, 9 South LaSalle street, Chicago, has been incorporated with a capital of \$50,000, to manufacture automobiles and trucks.

The Vindex Electric Mfg. Company, Aurora, Ill., has been organized with a capital of \$10,000 by T. E. Ryn, Mary A. and L. E. Landon to manufacture electrical and mechanical apparatus.

The Consumers' Ice Company, Elgin, Ill., is building a new refrigerating plant for the manufacture of artificial ice. With the new machinery to be added this company's entire plant at Elgin will have a capacity of 40 tons a day.

The city commission, Moline, Ill., has awarded the contract for new pumps for that city to the Epping-Carpenter Company, Pittsburgh, the amount of the bid being \$23,350.

The Sandage Foundry Company's plant at Oregon, Ill., has been purchased by the Paragon Foundries Company, Chicago, and the capacity of the Oregon plant will be turned to the making of piano plates.

The Altorfer Brothers Company, Roanoke, Ill., manufacturer of washing machines, whose plant was destroyed by fire, is about to erect a one-story factory on the same site.

The Hoerr-Adam Shoe Company, Belleville, Ill., has been incorporated with a capital stock of \$35,000 by John J. Hoerr, Otto Adam and Ben Merck, and will equip a manufacturing plant.

The American Carbon & Battery Company, East St. Louis, Ill., has been incorporated with a capital stock of \$250,000 by Henry Wrape, and others, and will equip a factory.

The board of public works, Ft. Wayne, Ind., will receive bids until March 24, for the installation of a turbo-generator set, auxiliary condensing plant and switchboard in the city electric light plant.

The car shops of the Wabash Railroad, Moberly, Mo., were burned March 9, with a loss approximating \$200,000.

The Northwestern Compo Board Company, Minneapolis, Minn., will build a factory, 100 x 100 ft., one story, reinforced concrete, at a cost of \$50,000.

The Imperial Machinery Company, 1611 Central avenue, Minneapolis, Minn., manufacturer of the Imperial 40 hp. tractor and a shock and hay loader, has been incorporated with a capital stock of \$500,000. On account of increased business throughout the West and Canada and in order to handle contemplated foreign business, it will enlarge its factory considerably. Alexander Currie, Cando, N. D., is president.

The City Council, St. Paul, Minn., has appropriated \$15,000 for the installation of a sewer system.

The Town Council, Minden, Iowa, has sold \$7000 of bonds for electric light improvements.

Bonds for an electric light plant have been voted by the citizens of Fort Calhoun, Neb.

The Martin Electric Light & Power Company, Dallas, S. D., is in the market for a turbine generator and electrical appliances of various kinds. D. H. Martin is manager.

Bids will be received by the board of commissioners, Huron, S. D., until March 26, for the construction of a filter plant, including one motor driven and one engine driven centrifugal pump and one 66 in. x 16 ft. horizontal tubular boiler and other equipment. L. T. Wolff, 1000 Germania Life building, St. Paul, Minn., is the engineer.

Milwaukee

MILWAUKEE, WIS., March 16, 1914.

The advent of seasonable weather has created a favorable sentiment all along the line. New construction that will demand power equipment and tools is being hastened. Immediate business, however, is slow and orders that are being placed are small and principally local. The resumption of operations by the Thomas Furnace Company has helped sentiment. Payrolls are gradually being enlarged. Skilled labor is plentiful.

Important coal dock extension and equipment contracts have just been placed at Superior, Wis. The C. Reiss Coal Company, Sheboygan, Wis., awarded a \$75,000 electrical bridge and hoist system for its No. 1 dock to Heyl & Patterson, Inc., Pittsburgh. The Pittsburgh Coal Company awarded the general contract for rebuilding and lengthening its No. 5 dock to the Sims-Carey Company, St. Paul, Minn. This work will cost \$450,000 and require two years for completion.

Bids on a woodworking shop for the Hamilton Mfg. Company, Two Rivers, Wis., to cost \$100,000, will be taken about March 20. Lockwood & Greene, 38 South Dearborn street, Chicago, are the engineers.

The Milwaukee Cycle Car Company, Milwaukee, organized several months ago by Charles J. and Stanley Eigel to manufacture cycle cars, has been incorporated with a capital stock of \$75,000 and will immediately commence the construction of 3000 cars. For the present the company will manufacture in the Eigel shops, 511-513 First avenue.

The Wisconsin Welding & Cutting Company, Milwaukee, has established a shop at 163-165 Barclay street, for the repair of boilers and automobile parts.

George W. Jagers, formerly of the Racine Mfg. Company, has organized the George W. Jagers Mfg. Company, as a consolidation of the Graham Mfg. Company and the Wadewitz Machinery Company, Racine, Wis. The new concern will specialize in the manufacture of internal combustion engines for automobile and agricultural use.

Bids will be received by Daniel Witzel, city clerk, Oshkosh, Wis., until March 21, for \$540,000 worth of water works bonds.

The Milwaukee River Canning Company, Thiensville, Wis., will build a brick factory, 115 x 115 ft., with steam heating system and power plant. W. F. Hillgen, Cedarburg, Wis., is the architect.

Kuester Brothers, West Bend, Wis., will build a concrete garage, 45 x 90 ft., two stories.

The West Bend Aluminum Company, West Bend, Wis., will open bids March 28 for the construction of its factory. Plans for the power house have been postponed. The Frederick Little Engineering Company, Fond du Lac, is the engineer.

The Northwood Furniture Company, Chippewa Falls, Wis., is planning to rebuild its burned wood-working plant. Jay Poznanski is general manager.

The Oneida Steam Laundry Company, Rhinelander, Wis., will build a laundry, 52 x 72 ft., with steam power plant and new equipment. W. C. Hawkins is owner.

The roundhouse, machine and blacksmithing shops

of the Superior & Southeastern Railroad, owned by the Willow River Lumber Company, Grand View, Wis., were destroyed by fire, causing a loss of \$35,000. The group will be rebuilt at once.

The A. M. Castle Engineering Company, LaCrosse, Wis., recently incorporated with \$50,000 capital, will engage in the manufacture of engines. Arrangements are now being made for factory space.

August Deering, Madison, Wis., has opened a shop at 323 South Wilson street for the manufacture of power boats and speed water craft, etc.

The Three Men Rail Laying Machine Company, La Crosse, Wis., will occupy the Pierce Machine Works, where the appliance has been manufactured. It is intended to greatly enlarge the output. Patrick H. Madden, LaCrosse, and Frank L. Pierce, of the Pierce Machine Works, are owners. The capital stock is \$25,000.

The Railway Materials Company, Chicago, has started work on remodeling and re-equipping the former Wisconsin Central carshops at Stevens Point, Wis., for the production of brake shoes. The drive will be by individual electric motors throughout. It is hoped to start operations April 1.

The Badger Mfg. Company, Two Rivers, Wis., manufacturer of farm implements and barn appliances, is arranging for an increased output.

The Laursen Automatic Pump Company, Eau Claire, Wis., plans to add the manufacture of special city water and high lift pumps embodying a new patented system of packing. The company is enjoying a heavy run of business.

Cleveland

CLEVELAND, OHIO, March 16, 1914.

Business in machine tool lines, while still dull, shows a slight improvement. Some orders were taken for two or three tools but most were for single machines. No new lists have come out and dealers have little business in prospect, except of the pick-up nature that comes out from day to day. While there is not much change in the general manufacturing situation, that little change appears to be toward an improvement. In the foundry trade the demand continues dull.

The Pattern Castings & Mfg. Company, Cleveland, has been incorporated with a capital stock of \$10,000 by W. F. Lerch and others.

The Cleveland Tap & Tool Company, Cleveland, has been formed with a capital stock of \$20,000 by H. J. McGovern, Albert Brook, and others, to manufacture metal working tools.

The Cuyahoga Spring Bed Company, Cleveland, has been formed with a capital stock of \$10,000 by Barnett Berman and others to manufacture spring beds.

The contract for a new boiler house to be built by the H. F. Watson Company, Erie, Pa., has been awarded to Arthur G. McKee, engineer, Cleveland, Ohio, who also has the contract for remodeling this company's power house. It will be a brick and steel building.

The Safety & Savings Gas Appliance Company, Lorain, Ohio, is being organized with a capital stock of \$50,000 to manufacture a safety valve to be used in connection with gas stoves. Among those interested in the company are J. H. Braddon, William E. Knight and W. N. Adams. The company will occupy a plant on Broadway near Seventeenth street.

The American Porcelain Company, East Liverpool, Ohio, has been formed to engage in the manufacture of pottery and has acquired the Croxall plant in that city. New machinery is being installed.

The Stewart Grain Shocker Mfg. Company, Xenia, Ohio, has been formed by Arthur Gessler, W. D. Wright, and others, with a capital stock of \$50,000 to manufacture farm implements.

D. P. Parker, director of public service, Akron, Ohio, will receive bids until March 23, for improving the waterworks and for three 150-hp. water tube boilers and one fuel economizer.

The Marsh-Brightman Nut Company, Sandusky, Ohio, which was recently organized to manufacture nut-making machinery, will shortly establish a plant in that city. The company has elected E. H. Marsh,

president; Frank E. Brightman, vice-president and manager, and E. L. Marsh, secretary and treasurer.

The Garford Mfg. Company, Elyria, Ohio, has been organized with a capital stock of \$1,300,000 to take over the plant and continue the manufacture of telephone apparatus and other products formerly made by the Dean Electric Company. The officers are A. L. Garford, president; A. G. Bean, vice-president; A. L. Patrick, treasurer, and John Watson, secretary.

Cincinnati

CINCINNATI, OHIO, March 16, 1914.

It is generally understood that most of the larger railroad systems are deferring purchases, except for immediate needs, until after the rate question is definitely settled. However, there are a few orders for single tools filtering through that help keep some firms busy. Business from the general trade is very irregular, and no particular section of the country is buying machinery of any kind, with the possible exception of the South, where woodworking and sawmill equipment is in good demand. The local dealers report a slightly better inquiry, but actual business continues backward in developing. A few jobbing foundries report a small improvement, but the majority of them are still operating to only about 50 per cent. of capacity.

On March 14 fire completely destroyed the plant of the Andrew Messmer Company, Cincinnati, entailing a loss of about \$60,000. The company manufactures lighting fixtures and other brass specialties. Latest reports indicate that the plant will be rebuilt at an early date.

Henry N. Hooper, architect, 519 Main street, Cincinnati, has been commissioned to draw up plans for a large reinforced concrete building to be erected for the Home Steam Avondale Laundry Company, Cincinnati. Mention of this proposed plant was made several weeks ago. Power plant and transmission equipment will be required.

Samuel Hannaford & Sons, Cincinnati, architects, have completed plans for the extensive addition to be made to the plant of the Western Methodist Book Concern, Cincinnati. The proposed improvement will cost approximately \$350,000, and considerable special machinery will be required, including a number of small electric motors.

Plans have been completed for the proposed branch plant of the Ford Motor Company, Detroit, Mich., to be located on Lincoln avenue, Cincinnati. The building will be 50 x 90 ft., five stories, and of reinforced concrete construction. Mention of the machinery requirements was made some time ago.

The Fleischman Company, Cincinnati, will need heating equipment for a large warehouse to be erected at Riverside suburb. The H. C. Hazen Contracting Company will erect the building.

The William Glenny Glass Company, Cincinnati, is considering making some extensive additions to its plant at Lancaster, Ohio. Plans have not yet been drawn up.

The American Concentrator Company, Joplin, Mo., is moving into its new plant at Springfield, Ohio. Very little new equipment will be required. Mention of the company's plans was made several weeks ago.

It is currently reported that the Midgeley Tire & Rubber Company will erect a plant at Lancaster, Ohio, the necessary capital being secured from local investors. Henry Peters is one of the principal members of the company.

The Conant Carriage Woodwork Company, Cincinnati, was recently incorporated with \$20,000 capital stock, to manufacture special buggy supplies. M. W. Conant is the principal incorporator.

The Hilane Garage & Machine Company, Columbus, Ohio, has been incorporated with \$10,000 capital stock, by Clarence Shockley, Charles S. Williams, and others, and will install a small repair shop for automobiles.

It is reported that the Kelly-Springfield Motor Truck Company, Springfield, Ohio, contemplates making some extensions to its plant early in the spring season. No details are available.

The Foster Stove Company, Ironton, Ohio, has acquired additional ground adjoining its property, and has plans under way for extending its manufacturing facilities. No details as to equipment requirements have yet been given out.

The Oakland Ice Company, Columbus, Ohio, is having plans prepared for a large ice and refrigerating plant that will be erected during the spring season.

The Louisville Machine Company, Louisville, Ohio, has increased its capital stock from \$10,000 to \$25,000 and contemplates increasing its manufacturing facilities.

The Portsmouth Street Railway Company, Portsmouth, Ohio, contemplates extending its line to Hanging Rock and Ironton. If present plans are carried out, additional power plant equipment will be required.

Extensive additions will be made to the plant of the Dayton Rubber Mfg. Company, Dayton, Ohio, whose increase in capital stock was recently noted. E. P. Hooven is president.

The Central South

LOUISVILLE, KY., March 16, 1914.

A slight depression marks the machinery market in this section, but prospects are excellent. This depression is ascribed chiefly to adverse weather conditions, snowfall and low temperature having stopped construction work. A number of orders have been booked recently for late delivery, and manufacturers and dealers will not be called upon to fill these before the middle of April or May. Farm engines are in fairly good demand. The market for refrigerating machinery has dropped off sharply, due to the lateness of the season. There is a moderate demand for boilers.

The Louisville & Nashville Railroad Company, with general offices in Louisville, is planning to build a car repair shop at its South Louisville shops and will buy metal-working machinery, motors, etc.

John Rohrmann, 1516 Inter-Southern Building, Louisville, is interested in a company which will equip a factory for the manufacture of a patented ice-making machine, to be operated by electric power.

H. Kleinstarink, florist, 2231 Letterle avenue, Louisville, will purchase a new 100-hp. tubular boiler.

The J. P. Willis Company's planing-mill, which was destroyed by fire with \$25,000 loss, will be rebuilt at once. New special machinery and probably three motors will be purchased.

Armour & Co., Louisville, will erect a refrigerating plant. The machinery for it will be purchased through the Chicago office.

The Sterling Spinning Company, Louisville, has been organized by George Dunham, and others, with a capitalization of \$25,000. It is in the market for transmission equipment only. Address Mr. Dunham, Paul Jones Building.

The Federal Parquetry Mfg. Company, Quicksand, Ky., recently incorporated, has leased a building in Lexington, Ky., for the manufacture of hardwood flooring. It is in the market for electrically operated equipment.

The Kentucky Public Service Company, Hopkinsville, Ky., will construct a power plant, to cost \$80,000. New turbines have been ordered.

Coal and timber lands in Letcher County, Ky., are to be developed by the Letcher County Coal & Improvement Company, recently organized at Whitesburg, Ky., by J. H. Frazier, and others, with a capital stock of \$100,000.

The St. Elmo Business Men's League, St. Elmo, Tenn., is planning to install a waterworks.

The Bristol Planing Mill Company, Bristol, Tenn., will erect a band mill near Abingdon, Va.

Ware & Goodwin have leased the Trezevant Waterworks Company's plant, Trezevant, Tenn., which it will enlarge.

The Forsythe Brothers Mfg. Company has been organized with a capitalization of \$10,000 by J. M. Forsythe, Waynesboro, Tenn., and others.

The town of Halls, Tenn., has voted \$25,000 bonds for buying and equipping a light and water plant.

O. B. Wunschow, Chattanooga, Tenn., is head of a company which has taken over the affairs of the Charles Rief Company, manufacturer of toilet articles. It is understood the new concern will enlarge the factory.

The Southern Railway will equip a round house and shops at Buntny, a branch of the Memphis postal district. A machine shop, boiler shop, etc., with yards are planned at a total cost of \$600,000.

Detroit

DETROIT, MICH., March 16, 1914.

The market the past week has been uninteresting and sales reported are confined to single tools. Future requirements before the trade are light and seem to be mainly for replacement purposes. There is a fair demand for special equipment in several lines and second hand machinery is in some request. General manufacturing conditions are satisfactory, and while factories are not crowded with work, there are few idle men in the city. Foundries are operating on an even basis with a fair run of new business. While the weather the past fortnight has been very favorable for building operations, no new projects of importance have come out.

The Crampton Automatic Pressure Fastener Company, Detroit, has been incorporated with \$25,000 capital stock to manufacture locks and special door fasteners. The incorporators are Basil R. Crampton, Isadore and Benjamin Wolf.

The Abbott Motor Car Company, Detroit, is erecting a brick addition to its plant, 60 x 75 ft., three stories, and will equip it with a sprinkler system and electric elevators.

The Briggs Mfg. Company, Detroit, automobile body manufacturer, has acquired the large plant formerly occupied by the A. C. Knapp Trimming Company. It is three stories, 200 x 210 ft.

The Pelton & Crane Company, Detroit, manufacturer of electrical supplies, has taken out a building permit covering the erection of a three-story brick factory, to cost \$7000.

Smith, Hinchman & Grylls, Detroit, architects, have prepared plans for a reinforced concrete factory, 75 x 130 ft., three stories, to be erected on Fort street West. Burns Henry, Penobscot Building, is the owner.

The Denton Mfg. Company, Lake Odessa, Mich., will remove its plant and business to St. Joseph, Mich., where a larger factory has been secured. The company manufactures furniture specialties.

The State Foundry Company, St. Johns, Mich., has filed a voluntary petition in bankruptcy. The business of the company will be discontinued.

The Brunswick-Balke-Collender Company, Muskegon, Mich., will shortly begin the erection of an extensive addition to its factory and will add a number of new products to its line.

The John D. Raab Chair Company, Grand Rapids, Mich., will build a new factory, 200 x 220 ft., for which expansion an increase in the capital stock of the company from \$75,000 to \$125,000 will be made.

The Wilmarth Show Case Company, Grand Rapids, Mich., has placed a contract for the erection of additions to its plant, 64 x 200 ft. and 64 x 50 ft.

Wheeling

WHEELING, W. VA., March 16, 1914.

The J. E. Moss Iron Works, Wheeling, W. Va., is building an addition to its plant, 50 x 150 ft. Most of the equipment has been purchased, but the company is still in the market for several pieces of structural shop equipment, particularly another punch, shear and cold saw.

The National Electric Sign & Construction Company, Morgantown, W. Va., has been incorporated with a capital stock of \$25,000 to manufacture electric signs and novelties. F. M. Grant, and others, are the incorporators.

The Columbus Producing Company, Charleston, W. Va., has been incorporated to operate for coal, etc.

The capital stock is \$2,500,000, and the incorporators are R. W. McIlvaine, John C. McNutt, Arthur B. Koontz, and others.

The Mannington Window Glass Company, Mannington, W. Va., has been incorporated with \$60,000 capital stock by Norman Braddock, C. D. Sweetland, George F. McCully, and others, Fredericktown, Ohio.

Kesselman & Company, Parkersburg, W. Va., manufacturers of oil and gas drilling tools, will install a shop at Branchland, W. Va., for the repair of heavy drilling machinery and for heavy blacksmithing.

The Parkersburg Corrugated Paper Company, Parkersburg, W. Va., has been incorporated with \$50,000 capital stock by S. W. Goff, and others.

The Cheat River Coal Company, Albright, W. Va., has been incorporated with \$500,000 capital stock by J. Clyde Markley, and others.

Birmingham

BIRMINGHAM, ALA., March 16, 1914.

Machinery dealers report a continuation of good buying by merchants handling agricultural implements and machinery, but very little on the part of railroads, contractors, sawmills and coal mines. There has been, however, a decided increase in structural lines and the machine tool prospect has brightened. Recovery from the bad conditions of last fall is slow, but dealers are inclined to look for continued betterment.

The first castings have been made by the new pipe plant of the United States Cast Iron Pipe Company, Birmingham.

Arrangements on the part of the Birmingham Railway, Light & Power Company to furnish by-product gas to the city of Birmingham have been delayed for further consideration.

J. H. Sheip & Co. will establish at Choctaw Point a veneer plant in place of the one that was burned with an estimated loss of \$65,000. All new machinery will have to be ordered.

The Guard Box Lumber Company will establish a plant at Mobile, in place of the one burned at an estimated loss of \$110,000.

It is understood that the Southern Gas and Electric Corporation, Baltimore, which acquired the properties of the Augusta Light Company, Augusta, Ga., will improve and enlarge them.

The city of St. Petersburg, Fla., has voted an issue of \$148,000 for the establishment of a municipal gas plant. J. B. McCrary Company, Atlanta, has prepared the plans and specifications. J. G. Bradley is mayor.

R. P. Laughlin, Savannah, Ga., and George W. Laughlin, Florence, S. C., have organized the Florence Iron & Machine Works, Florence, S. C., and the company has purchased and will operate the Florence Iron Works, which has been idle for some time. Machinery requirements have not been settled on.

The Nuway Packing Guard Company, Tuscaloosa, Ala., has been incorporated with a capital stock of \$50,000 by L. J. Snow, N. J. Rogers, J. T. Newby and others, to manufacture and sell an improved packing guard for railroad cars. Its product will be manufactured for the present by the Nashville Bridge Company, Nashville, Tenn. For further details, J. T. Newby, Jackson, Tenn., should be addressed.

The town of Clanton, Ala., has voted \$25,000 of bonds for water works improvements.

St. Louis

ST. LOUIS, Mo., March 16, 1914.

Conditions in the machine tool market have shown some slight improvement and a fair business is being transacted, perhaps what would be called a normal business for such an unusual period. The movement of equipment is chiefly in single tools and is mostly replacement business. There is considerable minor extension reported which runs into a fairly good total. Capital is still conservative, but nevertheless the feeling is healthy. The demand for second hand tools in this market is only fair. Business houses report collections in a reasonably satisfactory state.

O'Nofrez's Fire Extinguisher Company, St. Louis, has been incorporated with a capital stock of \$100,000 by Edward Schaefer, and others, to manufacture extinguishers, etc.

The Standard School Supply Company, Kirkwood, Mo., has been incorporated with a capital stock of \$18,000 by W. A. Smiley, and others, to manufacture school furniture and supplies.

The Ferd Messmer Mfg. Company, St. Louis, maker of brass goods, bar fixtures, etc., will move, it is stated, to larger quarters and add some new equipment.

The St. Louis Chair Company, St. Louis, has acquired a new location and will remove. Its facilities for manufacturing will be materially increased.

The Galt Light & Power Company, Galt, Mo., has been incorporated with a capital stock of \$10,000 by A. D. Miller, D. H. Clark and N. D. Jordan, to equip an electric light and power plant.

Large limestone quarries at Ste. Genevieve, Mo., are to be developed at once by K. F. Gill, contractor for the new State capitol. Equipment costing from \$75,000 to \$100,000 will be installed.

The Missouri-Kansas Auto Supply Company, Kansas City, Mo., has been incorporated with a capital stock of \$10,000 by A. T. and H. E. McCaskill and W. H. Jones and will equip a repair shop and garage.

The city of Poplar Bluff, Mo., will expend \$75,000 on an electric light plant. The mayor is in charge.

The Artesian Ice & Cold Storage Company, Savannah, Mo., will install a 10 ton ice plant and also cold storage facilities.

An ice plant is to be equipped at Steelville, Mo., by Martin Jones, who is reported in the market for the machinery.

The Springfield Ice & Refrigerating Company, Springfield, Mo., will be equipped to handle additional cold storage capacity. About \$15,000 is to be expended for machinery.

B. M. Hammer, Richmond, Mo., has plans for the equipment of a steam laundry and is reported in the market for machinery.

The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., which recently received permission to issue \$162,000 of bonds, will expend most of the amount in mechanical equipment.

The Velvaton Wood Needle Company, Kansas City, Mo., has been incorporated with a capital stock of \$20,000 by Fay Alexander, and others, to manufacture wood needles for talking machines.

A. D. Ward and A. H. Rago, Clarksville, Ark., expect to expend about \$50,000 on mining equipment, etc. The power plant capacity will be doubled.

The Texarkana Brick Company, Texarkana, Ark., has been incorporated with a capital stock of \$25,000 by W. Fouke, and others, and will equip a plant.

The Warren Cotton Oil & Mfg. Company, Warren, Ark., will spend about \$15,000 to rebuild and reequip that part of its plant recently burned.

The city of Clarksville, Ark., will expend about \$20,000 for an electric light and power plant.

The Chicago Veneer Company, Danville, Ky., recently organized by B. W. Lord, and others, will equip a plant at Clarendon, Ark., and is in the market for veneer cutting and drying machines, engines, boilers, blowers, etc.

The Sanitary Veneer Barrel Company, Little Rock, Ark., which was recently incorporated for \$500,000 by T. B. Ashby, Jackson, Tenn., and others, has purchased the machinery of the Ashby-Blatchley Mfg. Company, and will erect a factory at a cost of \$60,000.

The Safety Screwon Tip Company, Muskogee, Okla., has been incorporated with a capital stock of \$50,000 by J. M. Stivers, Oklahoma City, and others, of Muskogee, and will equip a plant for manufacturing a patented device.

The Western Foundry & Machine Company, Okmulgee, Okla., has been incorporated with a capital stock of \$50,000 by F. H. Cott, W. M. Rhoades and J. A. Coot to operate a foundry and do a machine shop business.

A franchise for the equipment and operation of an electric light and power plant at Quinton, Okla., has been granted to T. M. Morrill, and others, who will proceed with the installation.

The Williams-Miller Cotton Machinery Company, Elk City, Okla., has been incorporated by Amos Williams, and others, to manufacture cotton cleaners, cotton feeders and to do repair work on other cotton gin machinery.

W. T. Brady, Tulsa, Okla., has plans for the installation of a \$25,000 electric plant at Bristow, Okla.

The Gilchrist-Fordney Company, Laurel, Miss., will equip a central power plant, including the installation of six 150 hp. boilers, etc.

The Tylertown Light & Power Company, Tylertown, Miss., has been bought by T. C. Simmons and W. A. Boyd, who will increase the equipment of its plant.

The Crystal Ice & Fuel Company, Bay St. Louis, Miss., will add equipment to its Gulfport, Miss., plant to develop a capacity of 35 tons daily and will also increase its cold storage capacity. A. L. Stokoe is owner.

The DeQuincy Ice Refrigerating & Fuel Company, DeQuincy, La., has been incorporated by J. W. Brown, and others, to manufacture ice and do a general refrigerating and fuel business. It will build an ice manufacturing plant and will be in the market for special machinery about April 1.

The Sneed Automobile Company, Gulfport, Miss., has been incorporated with a capital stock of \$10,000 by R. J. and S. R. Sneed, and others, and will equip a repair shop and garage.

Texas

AUSTIN, TEXAS, March 14, 1914.

Conditions in the Southwest continue to improve, although not as rapidly as would be expected under the circumstances. A good rain fell over a large part of the State the first part of the week. This will be of great benefit to both corn and cotton crops. The demand for gin machinery is a noticeable feature at the present time. The irrigation machinery trade is also good.

The Continental Gin Company, Dallas, is preparing to make extensive improvements to its plant, amounting practically to a reconstruction of the entire manufacturing buildings and equipment. Bids will be received until March 26. A new factory building, office, powerhouse, pattern shop and casting storage building will be constructed at once. All the buildings will be of reinforced concrete, or entirely fire-proof construction. Further work contemplated includes the equipment of the power plant, heating and electrical equipment for all the buildings and the construction of dry kilns and a forge shop. Morgan G. Farrell, chief engineer for the Southern Engineering Corporation, New York City, is in charge.

The Missouri, Kansas & Texas Railway Company has plans in preparation for the building of a roundhouse and repair shops for its terminus at San Antonio, Tex.

George Miller, Marathon, has bought the power plant at Alpine, including an ice factory, for \$10,900. He will greatly improve the plant, it is stated.

The People's Light & Ice Company, Pittsburg, Texas, is being organized, and will erect a light plant and ice factory.

The Walker Irrigated Farms, Delval, is erecting a cotton mill, a lard refinery and a box factory in connection with its packing plant. Del Walker, Austin, is president.

It is announced that the cotton compress of the Exporters & Traders' Compress & Warehouse Company, Waco, destroyed by fire, will be rebuilt before the season opens.

The Crescent Creamery Company, Tucumcari, N. M., has been organized with a capital stock of \$10,000 to manufacture butter and handle farm products. It will erect a cold storage plant in connection with its creamery. M. M. Mortensen and H. L. Boon, Tucumcari, are the incorporators.

E. Goodrich, Casa Grande, Ariz., is planning to install machinery to irrigate 540 acres.

The Southern Traction Company is moving its shops from Dallas to Monroe, where the mechanical departments of the company will be centralized.

The Pacific Coast

SEATTLE, WASH., March 10, 1914.

Local machinery houses report business better, in a slight degree, and make mention of an increased number of sales in the past two weeks. A steady increase in demand from the interior of the north Pacific States has set in, not only for implements, which are moving extremely well for this season, but for miscellaneous lines, such as canning and dairy machinery, steam, electric and gasoline power units, box factory equipment, etc. Much of the small machine tool business also comes from these scattered shops through the interior. There is in addition some figuring on hydroelectric development to be carried out the coming summer. Orders for supplies continue to come out well from the lumber and logging industry along the coast. Export shipments of machinery to the Orient continue large and some good shipments of mining machinery, etc., have been dispatched for southeastern and western Alaska. With the establishment of a direct line of steamers between Portland and Honolulu, local merchants and manufacturers expect to get a larger share than ever of the Sandwich Islands trade.

Considerable development work is going on in logging camps around Coos Bay, where delivery was recently made of a large lot of dump cars, a locomotive and material for a mile of railroad.

The Federal Government, through the Department of Labor, will attempt to restore industrial peace in the Gray's Harbor and Upper Puget Sound districts where shingle mill and lumber manufacturing strikes and lockouts threaten to cause serious losses in the industry. A representative has been ordered to offer his services as peacemaker. The same trouble which has been threatening the Bellingham district, where the largest lumber mills are located, has been dissipated, and mills, with but few exceptions, are running to full capacity. Greatly improved business conditions are looked for in the immediate future.

The Aero Fire Alarm Company, 208 Columbia street, Seattle, has been awarded the contract for the installation of automatic fire alarm systems in the buildings of the Panama-Pacific International Exposition, at a cost of about \$100,000. F. J. Martin, manager, states this is one of the largest contracts of its kind ever made.

The Enterprise Brass Foundry Company, Seattle, will erect a two-story brass foundry building at 2727 Seventh avenue, South, at a cost of \$10,000. Orders for machinery have not yet been placed.

The Laconia Lumber & Paper Company, Seattle, has been incorporated by S. L. Cavens, and others. It plans the erection of a lumber mill on Lake Union, with a capacity of 80,000 ft. a day. Plans also include the subsequent erection of a paper mill.

The Seattle port commission is making a strong effort to have plans ready April 1 for bids for the large grain elevator which the city will build on the waterway. Special machinery will be installed. H. M. Chittenden is chairman of the commission.

E. B. Bagley, secretary, Seattle, Wash., will receive bids until March 20 for furnishing a pump and electric motor.

The Tannatt-Allen Engineering Company, Spokane, Wash., has taken a contract to build motors of a type recently patented by N. M. Cook.

The Pacific Coast Coal Company, Eighteenth and Dock streets, Tacoma, contemplates the erection of coal sheds, garage and other improvements, including the installation of a locomotive crane, at a cost of \$15,000.

The Bloedel-Donovan Lumber Company, Bellingham, Wash., has awarded to the Allis-Chalmers Company, Seattle, the contract for supplying turbine motors and other machinery for electrifying its lumber mills.

A. Welsh, Newport, Wash., announces that he will soon begin construction on a hydroelectric plant to cost \$150,000. The plant will supply Newport and adjacent cities with light and power.

The Toledo Lumber Company, Toledo, Ore., is adding a lot of new equipment and replacing some of its old machinery in order to bring its daily capacity to 150,000 ft. a day.

The town of Orencio, Ore., recently voted a bond issue for a municipal water system. Plans are being prepared.

E. J. Gordan and others, of Hailey, Idaho, have been granted franchise for the operation of a hot water works system. A plant will be built at Hailey Hot Springs.

O. H. Bennett, Spokane, Wash., will build a modern electric light and power plant at Melstone, Mont.

The City Commission, Sacramento, Cal., under instructions from commissioner of public works, E. M. Wilder, is taking the preliminary steps for storage system improvements, at an estimated cost of \$1,000,000. The city has also disposed of \$200,600 sewer and drainage bonds. The work will include the installation of a pumping station.

The City Commission, Salt Lake City, Utah, has authorized the issue of \$900,000 bonds for sewer and water works improvements.

Eastern Canada

TORONTO, ONT., March 14, 1914.

The Miramichi Quarry Company, Ltd., 10 Richmond square, Montreal, is in the market for second hand quarry equipment and stone dressing machinery, including the following list:

One large sized planer, preferably with attachment for circular work.

One large saw, diamond or carborundum toothed, equipped with either circular blade of large diameter, or a straight cut or drag saw of the Young and Farrell types.

One lathe for turning stone columns, etc.

One vertical boring mill, for sizes up to 4 ft. high and 6 ft. diameter.

One scabbling machine.

One overhead traveling crane, between 15 and 30 tons capacity.

One quarry bar for mounting a Rand steam drill.

One steam shovel, preferably revolving type, for standard gauge track, with a 1-cu. yd. dipper.

The J. C. McLaren Belting Company, Ltd., Montreal, has increased its capital stock from \$75,000 to \$150,000.

Pulp & Lumber, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Henry Lampard, Westmount, Que., Henry M. G. Bellew, and others, Montreal, to manufacture lumber, pulp, paper, etc.

A. Aubry & Sons, Ltd., Montreal, has been incorporated with a capital stock of \$150,000 by Adolphe Aubry, Joseph O. Langevin, and others, to manufacture castings, sheet metal goods, stoves, etc.

The Metallic Tire Expander, Ltd., Montreal, has been incorporated with a capital stock of \$250,000 by George L. Alexander, Herbert Hughes, A. T. Paul, and others, to manufacture tires, machinery and accessories for automobiles, etc., and to carry on the business of brass founding.

The Interprovincial Brick Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$500,000 by Richard T. Heneker, Walter S. Johnson, Edward J. Waterton, and others, to manufacture brick, terra cotta, etc.

The Canadian Union Metal, Ltd., Galt, Ont., has been incorporated with a capital stock of \$40,000 by Don C. Barrick, Charles H. Barrick, and others, of Canton, Ohio, to manufacture metal porch columns, metal furniture, etc.

The John C. Gilchrist Lumber Company, Ltd., Toronto, has been incorporated with a capital stock of \$200,000 by John C. Gilchrist, George H. Gilchrist, George C. Paterson, and others, to operate a planing mill, wood working plant, etc.

The National Electric Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by William J. Konkle, George G. Fieghen, and others, to manufacture machinery and electrical appliances, etc.

The Eureka Rubber & Tire Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Edward Gillis, Percy C. Greaves, and others, to manufacture rubber goods, etc.

The Lion Silverware Company, Ltd., Galt, Ont., has been incorporated with a capital stock of \$40,000 by William J. Doran, Arthur Traver, and others, to manufacture metal ware, etc.

The Excelsior Needle Company, Torrington, Conn.,

will erect an addition to the plant of the Carey Needle Company, Bedford, Que., recently purchased.

The Rutenberg Company, Berlin, Ont., will erect a factory for the manufacture of automobile engines, etc.

The Brantford Ice Company, Brantford, Ont., will erect a plant for the manufacture of ice.

The American Good Roads Machinery Company, Goderich, Ont., will make additions to its factory, to cost about \$90,000.

The Standard Underground Cable Company, Hamilton, Ont., will erect an addition to its factory, to cost about \$150,000.

The Chadwick Brass Company, Hamilton, Ont., is looking for a site to erect a three-story plant with machine shop, plating rooms, etc.

The Canada Grate & Supply Company, London, Ont., will erect a plant to manufacture a new type of grate bar.

The Oxford Furniture Company, Oxford, N. S., is making additions and adding new machinery to its factory.

The Canadian Oil Refinery, Petrolea, Ont., will erect a two-story addition to its plant, to manufacture wax. Machinery will be required.

The Oxford Foundry & Machine Company, Oxford, N. S., will add new machinery to its plant.

The Foundry Specialties Company, Toronto, will rebuild its plant, recently destroyed by fire. W. S. Thompson, 358 Brunswick avenue, Toronto, is the architect.

The Canadian Seamless Wire Company, Toronto, whose plant was recently destroyed by fire will erect a plant on Clinton street.

The Claus Shear Company, Toronto, will erect a factory to manufacture cutlery.

Beam Brothers, Waterloo, Ont., will erect a factory to manufacture threshing machines, engines, etc.

George Watson, Flesherton, Ont., will erect a sash and door factory at Markdale, Ont.

The Tuckett Tobacco Company, Ltd., Montreal, will erect a factory, to cost \$100,000.

The Martin-Senour Company, Ltd., Montreal, will erect a four-story paint factory.

The Ideal Concrete Machinery Company, Windsor, Ont., will erect a plant to cost \$7000.

The Welland Machine & Foundries, Ltd., Welland, Ont., will erect an addition to its factory.

The ratepayers of Burford, Ont., passed a by-law to provide for the erection of a distributing station and equipment.

E. C. Lawrence, Sarnia, Ont., will erect a large planing mill.

The McQuay Tanning Company, Owen Sound, Ont., manufacturer of harness leather, will double the capacity of its plant.

A. Michaud, Quebec Bank Building, Montreal, is contemplating the erection of a factory, to cost \$50,000.

The plant of the Standard Clay Products, New Glasgow, N. S., was completely destroyed by fire. The loss is estimated at \$60,000.

The ratepayers of Alliston, Ont., have granted concessions to the Dominion Gas Tractor Company, which will erect a factory to manufacture gas traction engines for farm use.

Western Canada

WINNIPEG, MAN., March 14, 1914.

The situation in machinery in series is unchanged. The volume of business is moderate, but prospects continue favorable. It is predicted on every hand that there will be a great deal of industrial development after the opening up of spring. Reports indicate that there will be a good demand for municipal utilities equipment, such as waterworks, electric light and gas plants, street railway extensions and power development. A number of the larger towns and cities are making preparations for such improvements.

Cowin & Fee, Ltd., Winnipeg, have been incorporated with a capital stock of \$50,000 by James Cowin, Ernest F. Fee, and others, to manufacture and deal in builders' supplies, etc.

W. H. Osborne, president Wisconsin Malleable Iron Company, Milwaukee, has been in conference with John Crear, of Crear, Clinch & Co., Chicago, in regard to the erection of a plant at Fort William, Ont.

The Capital City Box Company, Ltd., Edmonton, Alta., will make additions to its factory.

The factory of J. Brooks, manufacturer of sash and doors, New Westminster, B. C., was destroyed by fire. The loss is estimated at \$41,000.

Mr. Haekel, of the Commercial Cars, Ltd., Luton, England, is looking for a suitable site at Vancouver, B. C., for the erection of a factory.

The Bertrand Lockhart Lumber Company, Victoria, B. C., will erect a planing mill.

E. A. Waterman, manager of the Weiler Brothers, Ltd., furniture manufacturers, Victoria, B. C., announces that the firm will soon be in a position to start the erection of its factory.

The Great Northern Tannery Company, Ltd., North Edmonton, Alta., will double the capacity of its plant. New machinery will be required.

The Presto Heater Company, Edmonton, Alta., will erect a plant for the manufacture of furnaces, etc.

E. W. Bull, superintendent light and power, Regina, Sask., will receive bids until March 28, for furnishing electric generating equipment.

It is announced that Bruce O'Dell, lumberman, of Cadillac, Mich., will establish a sawmill, with a daily capacity of 100,000 ft., at Willow River, British Columbia.

The civic improvements in the city of Edmonton, Alta., during 1914, include a filtering plant and additions to the waterworks, to cost about \$1,125,000.

Robert McNair, Vancouver, B. C., is erecting a shingle mill at Port Moody, B. C. The estimated output will be 350,000 shingles per day, or 700,000 a day on double shift.

W. H. Stiles, secretary of the town of Humboldt, Sask., is calling for tenders, until April 15, for equipment for the projected waterworks and sewage system. The engineers are Chipman & Power, Mail Building, Toronto.

The ratepayers of Regina, Sask., have voted favorably on a by-law to provide money for extension of the waterworks system.

The old shingle mill at Columbia Station, Sumas, B. C., has been purchased by H. Brown, and associates, of Seattle, who are planning to rebuild and equip the plant with new machinery.

The T. K. Smith Lumber Company, Ltd., Armstrong, B. C., will make a number of improvements in its sawmill.

The mill of the Westminster Woodworking Company, New Westminster, B. C., which recently burned, with a loss of \$75,000, will be rebuilt at once.

The Hafer Machine Company, Victoria, B. C., has been incorporated with a capital of \$15,000, to carry on business as iron founder and mechanical engineer.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until April 7, schedule 6531, for one 75-in. boring and turning lathe, and two extra heavy high duty lathes for Washington; schedule 6534, for 40,000 ft. plow-steel hoisting cable for Brooklyn; schedule 6537, for three single-phase transformers for Norfolk; schedule 6539, for miscellaneous taps and dies for Washington; until April 14, schedule 6526, for two portable core ovens for Mare Island; schedule 6527, for miscellaneous hand pipe-threading devices and two pipe-threading and cutting machines for Puget Sound; schedule 6529, for 2300 ft. belt conveyor for Brooklyn.

The United States Reclamation Service, 605 Federal Building, Los Angeles, Cal., will receive sealed proposals until March 23, under advertisement 278, for furnishing three geared single acting triplex plunger pumps. Information may be obtained from O. H. Ensign, chief electrical engineer.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on March 10 for material and supplies for the navy yards as follows:

Schedule 6374, Steam Engineering.

Class 42, Puget Sound—One brake—Bid 177, \$238 and \$554; 194, \$246; 200, \$241.
Alternate—Do, f. o. b. works—Bid 177, \$198 and \$415; 194, \$198; 220, \$200.

Class 43, Puget Sound—One throatless cutting shear—Bid 24, \$477; 128, \$430; 177, \$435.
Alternate—Do, f. o. b. works—Bid 24, \$452; 128, \$400; 177, \$400; 220, \$475; 260, \$1,105.

Class 44, Puget Sound—One bench and slitting shear—Bid 194, \$147; 311, \$153.70.
Alternate—Do, f. o. b. works—Bid 117, \$113.40; 194, \$120; 311, \$135.70.

Class 45, Puget Sound—One ring and circle shear—Bid 177, \$45; 200, \$50; 311, \$51.89.
Alternate—Do, f. o. b. works—Bid 117, \$112; 177, \$38.25; 311, \$42.50.

Schedule 6398, Ordnance.

Class 91, Washington—One No. 3 cone drive universal milling machine—Bid 32, \$1,287.50; 98, \$1,253.50; 126, \$1,057; 155, \$1,263.10; 177, \$1,190; 188, \$1,213; 196, \$1,090 and \$1,055.

Schedule 6399, Construction and Repair.

Class 101, One triple-plunger electric-driven pump—Bid 23, \$878; 45, \$580; 46, \$678; 76, \$460.80; 155, \$652.75 and \$717.50; 190, \$548; 249, \$751; 319, \$893.60.

Schedule 6401, Construction and Repair.

Class 103, Brooklyn—Bid A, for furnishing and erecting crane, maximum lift of hook 40 ft.—Postponed to March 17.

Schedule 6402, Construction and Repair.

Class 104, Brooklyn—294 pneumatic scaling hammers—Bid 54, \$11.50; 60, \$12.50; 90, informal; 130, \$14.75; 141, \$20; 303, \$14.25.

Class 105, Brooklyn—166 pneumatic hammers—Bid 54, \$2,978.50; 60, \$2,644; 90, informal; 130, \$2,777.25; 141, \$3,220; 303, \$4,194.20.

Class 106, Brooklyn—69 pneumatic hammers—Bid 54, \$1,913.50; 130, \$2,242.50; 141, \$1,897.50; 303, \$2,874.55.

Class 107, Brooklyn—Five jam riveters and three bottom riveters—Bid 54, \$775; 130, \$500, part; 141, \$416; 303, \$440.

Class 108, Brooklyn—Nine short holders-on and 17 long do—Bid 54, \$403; 130, \$429; 303, \$448.70.

Class 109, Brooklyn—281 non-reversible pneumatic drilling machines—Bid 54, \$11,811.50; 130, \$16,140; 141, \$11,596.

Class 110, Brooklyn—Two reversible pneumatic drilling machines—Bid 54, \$70; 130, \$80; 141, \$68.

Class 111, Brooklyn—45 pneumatic drilling machines—Bid 54, \$2,700; 141, \$2,925.

Class 112, Brooklyn—10 pneumatic woodboring machines—Bid 54, \$401; 130, \$530; 141, \$420.

Schedule 6417, Construction and Repair.

Class 163, Norfolk—Two complete sets of dies and one complete equipment—Bid 50, \$1,655; 260, units.

The names of bidders and the number under which they are designated in the above list are as follows:

23. Buffalo Steam Pump Company.
24. Berger & Carter.
32. Brown & Sharpe Mfg. Company.
45. F. A. Branda & Co.
46. Blake & Knowles Steam Pump Works.
50. E. W. Bliss Company.
54. Chicago Pneumatic Tool Company.
60. Cleveland Pneumatic Tool Company.
90. Electro Magnetic Tool Company.
98. Fairbanks Company.
117. Charles H. Graft.
126. Hill, Clark & Co.
128. Hallidie Machinery Company.
130. Ingersoll-Rand Company.
141. Independent Pneumatic Tool Company.
155. Kemp Machinery Company.
177. Manning, Maxwell & Moore.
188. Niles-Bement-Pond Company.
190. National Electrical Supply Company.
194. D. Nast Machinery Company.
196. Oesterlein Machine Company.
200. Perine Machine Company.
220. Joseph T. Ryerson & Son.
249. Sterrett & Fleming.
260. D. H. Stoll Company.
303. Wiener Machinery Company.
311. Manufacturers' Agency & Sales Company.
319. William E. Williams.

Government Purchases

WASHINGTON, D. C., March 16, 1914.

The Secretary of the Interior has instructed the Reclamation Commission to complete without delay some 32 reclamation projects at an estimated figure of \$23,500,000. Among the items of expenditure approved are the following for power equipment: For the Salt River project, Arizona, \$154,321 on the power system; for the Boise project, Idaho, at the Arrowrock reservoir, \$14,000; for the Minidoka project, Idaho, \$17,570 for enlarging the capacity of the South Side pumping station, \$5700 on the West End pumping extension and \$9500 on the sub-station at Burley and Marshfield, etc.; for the Truckee-Carson project, Nevada, \$50,000 on hydroelectric developments; for the Okanogan project, Wash., an unstated amount for enlargement of the pumping plant, included in item for concrete lining of canals, etc.; for the Yakima-Sunnyside project, Wash., \$190,000 for pumping plant machinery. This last item is contingent on water users meeting the requirements of the department.

Trade Publications

Steel Lettering Dies and Stamps.—James H. Matthews & Co., 3942 Forbes street, Pittsburgh, Pa. Catalogue. Shows a line of dies and stamps which are made in sets of individual letters and in special combinations for marking products of various kinds with trademarks and symbols. These dies are made for marking tools, pipe, logs, billets, tin plates, steel rails and in fact practically all kinds of products that require marking. A tin tag addressing machine and a semi-automatic tag marking machine for the type embossing of tin tags, etc., are featured. Mention is made of a number of different embossing dies that have been made, including one 30 in. in diameter for the head of a steel barrel. In addition to illustrating the various kinds of dies that can be supplied a number of views are given of the products that have been marked by them.

Automatic Cut-off Valves.—Lagonda Mfg. Company, Springfield, Ohio. Booklet. Describes an automatic cut-off valve which is located between each boiler in a battery and the steam header and closes automatically if there should be an abnormal flow of steam in either direction. It also takes up the cause and effect of water hammer in boilers, the effect of cutting in boilers below or above the pressure of the steam header, the specifications of boiler insurance companies and the method of making the Government tests. Views of the valve itself are given together with engravings of a number of actual installations.

Cranes.—Northern Engineering Works, Detroit, Mich. Catalogue No. 26. Illustrates electric and hand power traveling cranes, electric and pneumatic hoists, overhead track systems and bucket handling and railroad cranes. The catalogue is condensed from the series of bulletins which are issued describing the cranes, and a number of views of installations are included.

Sight Flow Indicator.—Richardson-Phenix Company, Milwaukee, Wis. Bulletin No. 57. Illustrates and describes a device that can be inserted in a pipe line, carrying a liquid such as the supply pipes of water jackets of gas engines and air compressors and the water lines of water cooled transformers. Recent improvements made in the indicator, by which it is possible to adjust it so that an alarm will be given when the liquid drops to some predetermined minimum, are also described. Views are given of the several types of indicators which can be supplied with a spring or electrical connections for operating on open or closed circuits.

Pickling Machines.—Mesta Machine Company, Pittsburgh, Pa. Bulletin M. Refers to the pickling process for removing the scale and other substances from metal objects of any shape, and describes a machine consisting of a number of horizontal arms, radiating from a central plunger and carrying suspended acid-proof crates. The operation of the machine, which is governed by steam pressure and gravity, is given, and there are views of the machine both with and without an overhead bearing and a line drawing showing the way in which the base casting is embedded in concrete. An illustrated description of this machine appeared in *The Iron Age*, November 20, 1913.

Suspension Crane Scale.—Buffalo Scale Company, Buffalo, N. Y. Bulletin No. 615. Concerned with a scale that can be used in connection with any style of crane or by suspension from an overhead beam or any projection that affords safe facilities for attaching. A brief description of the scale which is built in a number of sizes from 2500 to 40,000 lb. is given, together with a view of the device.

Cutting Machine.—Clark Foundry Company, Rumford, Maine, Chandler & Farquhar Company, 419 Atlantic avenue, Boston, Mass., general agent. Leaflet. Illustrates a machine designed for cutting up fabric, rubber tires and other material of a similar nature.

Non-Ferrous Castings.—Atkinson Company, 575 Lyell avenue, Rochester, N. Y. Pertains to a line of general and special castings in brass, bronze, phosphor and manganese bronze and aluminum. The castings made include those for steam engines and rollers, railroads, shipyards, steam pumps, electric railways, paper mills, vacuum cleaners, internal combustion engines of all kinds and work for the Panama Canal. Views of portions of the plant and different castings are given and data on the weight of castings and different metals are included.

Furnaces.—Monarch Engineering & Mfg. Company, 1200 American Building, Baltimore, Md. Pamphlet and circular. The pamphlet lists a line of melting and refining furnaces and foundry equipment using oil or gas with air or coke, if desired, for brass, bronze, aluminum, nickel, monel metal, ferro-alloys, ores, cyanides, assay work, etc. All of these furnaces are illustrated and briefly described and in addition the special fuel oil burner employed is featured. Mention is also made of a core oven that is heated with oil, gas, coal or coke and has a double overhead trolley and blowers for fur-

nishing the air blast for use in connection with the gas and oil fuel. The leaflet refers to a combination toolroom furnace, using gas as fuel and combining an oven, muffle, small forge, lead tempering, cylindrical, end heating, carbon steel and high speed steel furnace in one unit.

Lathe.—Worcester Lathe Company, 134 Gold street, Worcester, Mass. Circular. Illustrates and describes an 11-in. lathe equipped with compound rest and power cross feed. A view of the lathe is given and the description of the several parts is supplemented by a number of halftone engravings. An illustrated description of the tool appeared in *The Iron Age*, November 27, 1913.

Fuel Oil Burner.—Production Engineering Company, 1716 Spring Garden street, Philadelphia, Pa. Pamphlet O. Contains some facts about fuel oil as used in industrial plants and mentions briefly what this company is prepared to do in the designing and remodeling of furnaces of various types so that fuel oil can be used. An illustration and brief description of the burner of this company is included.

Automatic Relief Valve.—Philadelphia Steam Heating Company, Juniper and Cherry streets, Philadelphia, Pa. Folder. Relates to the use of the Keystone automatic water and air relief valve, which is especially adapted for use as a return trap for radiators, coils, dryers, etc., in connection with vacuum systems or where steam is circulated by vacuum return lines. It is claimed that this valve will permit the removal of air and water of condensation from the system without any waste of steam. One of the special features of the valve is the providing of a key-controlled by-pass for use in case the automatic parts are temporarily stopped. An exterior view of the valve is given, together with line drawings, showing the construction of two different types.

Machinery Manufacturing.—Modern Machinery Company, Wilmington, Del. Folder. Calls attention to the work which this company is prepared to perform in the manufacture of machinery under contract. This includes the building of machinery up to a total weight of one ton, the making of jigs and fixtures and automobile and engine parts, machining forgings and castings, finishing all kinds of bar work, gears and gear blanks and especially turret lathe work. The folder is made up almost entirely of a number of views of the work turned out by this company on different contracts.

Fans and Blowers.—Clarge Foundry & Mfg. Company, Kalamazoo, Mich. Catalogue No. 3. Describes a line of steel plate, cone and engine-driven fans and heaters and contains general references to a line of small exhaust fans and blowers. The construction of the steel plate fans is gone into at some length, the text being supplemented by halftone engravings of the various products. Tables of capacities of the single and double inlet types are given, together with dimension tables for the various arrangements. Specification, dimension and capacity tables are also included for a line of pipe coil heaters.

Storage Battery and Industrial Trucks.—C. W. Hunt Co., Inc., West New Brighton, N. Y. Catalogue No. 13-4. Shows an industrial truck for conveying bulky and heavy material around manufacturing plants, steamship and railroad terminals, etc. The power is supplied to the driving motor by a storage battery and a simple system of control enables it to be operated by one man. After a description of the truck which is supplemented by engravings of the different parts, views are given of it in use. An illustrated description of the truck appeared in *The Iron Age*, November 20, 1913.

Metals, Alloys and Fluxes.—American Alloys Company, South and Baltimore streets, Baltimore, Md. Folder. Concerned with a line of fluxes for brass foundries and alloys of copper with manganese and silicon. The uses and advantages of these fluxes and alloys are briefly given and a list of the other alloys made by this company is included.

Mine Pumps.—Harris Pump & Supply Company, Pittsburgh, Pa. Bulletin. Consists of a number of loose leaf circulars of different types of mine pumps arranged for operation by an electric motor. Each of the circulars is given over to one particular kind of pump, with an illustration of it and a brief description of the class of service for which it is intended to be used.

Ball Bearings.—S. K. F. Ball Bearing Company, 50 Church street, New York City. Bulletin No. 11. Contains a brief description of the construction and methods of manufacturing these bearings and instructions for mounting them, the text being supplemented by a number of halftone engravings and line drawings. Instructions on the selection of the proper size of bearing are given, followed by tables of dimensions and load ratings of a number of different types of self-aligning bearings. A ball bearing shafting hanger, which was illustrated in *The Iron Age*, July 3, 1913, is mentioned, and a number of pages are given over to the illustration of typical applications of the bearings.

Established

A M

There is
increasing de-
mand for these pro-
ducts by manu-
facturers in
and in dev-
eloping countries.
the cold drawn
bars are placed in



View of the

Company, em-
ployed and
plant are
features of
maximum
rangement
effect plant

A wide
range of bars up to
and including